INVESTIGATING PRE-SERVICE EARLY CHILDHOOD TEACHERS' SELF-EFFICACY BELIEFS REGARDING EDUCATION FOR SUSTAINABLE DEVELOPMENT TEACHING

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Approval of the Graduate School of Social Sciences

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I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

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ABSTRACT

INVESTIGATING PRE-SERVICE EARLY CHILDHOOD TEACHERS' SELF-EFFICACY BELIEFS REGARDING EDUCATION FOR SUSTAINABLE DEVELOPMENT TEACHING

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The aims of this study were describing pre-service early childhood education (ECE) teachers' Education for Sustainable Development (EfSD) teaching self-efficacy beliefs constructed around outcome expectancy beliefs and personal teaching efficacy regarding EfSD, attitudes toward Sustainable Development (SD), and SD knowledge; investigating whether EfSD teaching self-efficacy beliefs, SD attitudes and SD knowledge of pre-service ECE teachers differ with respect to auto-biographical factors; exploring predictive roles of SD attitudes, SD knowledge and personal EfSD teaching efficacy on outcome expectancy beliefs regarding EfSD. Participants of study were 541 freshmen, sophomore, junior, and senior ECE teacher candidates in Ankara. Data was collected by using scales; Demographic Information Form, EfSD Teaching Beliefs Scale (EfSD-B), Attitudes toward SD Scale (ASD), and SD Knowledge Scale (SD-K).

The results of exploratory and confirmatory factor analyses indicated that the Turkish adaptation of EfSD-B and ASD scales are valid and reliable in terms of determining pre-service ECE teachers' EfSD teaching self-efficacy beliefs and

attitudes toward SD. In main study, pre-service teachers were found to have moderate sense of attitudes toward SD, SD knowledge, and EfSD teaching self-efficacy beliefs including outcome expectancy beliefs and personal teaching efficacy regarding EfSD. Moreover, pre-service ECE teachers' EfSD teaching self-efficacy beliefs, SD attitudes and SD knowledge did not differ with respect to auto-biographical factors except from the significant effect grade levels on SD attitudes. Lastly, personal EfSD teaching efficacy, SD knowledge and SD attitudes were found to have a predictive role on outcome expectancy beliefs of pre-service ECE teachers regarding EfSD teaching.

Keywords: Education for Sustainable Development, Self-Efficacy Beliefs, Attitudes, Knowledge, Pre-service Early Childhood Teachers

ÖZ

OKUL ÖNCESİ ÖĞRETMEN ADAYLARININ SÜRDÜRÜLEBİLİR KALKINMA ÖĞRETİMİNE YÖNELİK ÖZ-YETERLİK İNANÇLARININ İNCELENMESİ

KÖKLÜ, Hasret
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Bu çalışma üç temel amaçla yürütülmüştür. Çalışmada, okul öncesi öğretmen adaylarının Sürdürülebilir Kalkınma için Eğitimi (SKE) öğretmeye yönelik öz-yeterlik inançlarını ve alt boyutları olan sonuç beklentisi inançları ile kişisel öz-yeterlik inançlarını; Sürdürülebilir Kalkınmaya (SK) yönelik tutumlarını ile SK bilgisini belirlemek,; SKE'yi öğretmeye yönelik öz-yeterlik inançları, SK'ye yönelik tutumları ve SK bilgi düzeylerinin oto-biyografik değişkenlere göre farklılık gösterip göstermediğini incelemek ve ayrıca, SKE'yi öğretmeye yönelik sonuç beklentisi inançlarının yordanmasında; SKE'yi öğretmeye yönelik kişisel öz-yeterlik inançlarının, SK tutumlarının ve SK bilgi düzeylerinin etkisinin olup olmadığını incelenmesi amaçlanmıştır. Bu amaçla, veriler 2016-2017 eğitim-öğretim yılı bahar döneminde dört ayrı ölçek kullanılarak toplanmıştır: Kişisel Bilgi Formu, Sürdürülebilir Kalkınma için Eğitimi Öğretmeye Yönelik İnançlar Ölçeği, Sürdürülebilir Kalkınmaya yönelik Tutumlar Ölçeği ve Sürdürülebilir Kalkınma Bilgisi Ölçeği.

Açımlayıcı ve Doğrulayıcı Faktör Analizi sonuçları, kullanılan ölçeklerin geçerli ve güvenilir olduğunu göstermiştir. Betimsel istatistik sonuçlarına göre, öğretmen adaylarının orta düzeyde sonuç beklentisi inançları ve kişisel öz-yeterlik inançlarını da içeren SKE öğretimine yönelik öz-yeterlik inançlarına, SK tutumlarına ve SK bilgisine sahip oldukları görülmüştür. Ayrıca öğretmen adaylarının SK'ye yönelik tutumlarının öğrenim gördükleri sınıf düzeyine göre farklılaşması dışında, SKE öğretimine yönelik öz-yeterlik inançlarının, SK tutumlarının ve bilgilerinin otobiyografik faktörlere göre değişmediği bulunmuştur. Son olarak, öğretmen adaylarının SKE'yi öğretmeye yönelik sonuç beklentisi inançlarının sırasıyla, SKE'yi öğretmeye yönelik kişisel öz-yeterlik inançları, SK bilgisi ve SK tutumları üzerinde anlamlı bir yordayıcı etkisi olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Sürdürülebilir Kalkınma için Eğitim, Öz-Yeterlik İnançları, Tutumlar, Bilgi, Okul Öncesi Öğretmen Adayları

To My Parents,
Hafize & Hacı KÖKLÜ

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LIST OF ABBREVIATIONS

CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
ECE	Early Childhood Education
EE	Environmental Education
EFA	Exploratory Factor Analysis
EfSD	Education for Sustainable Development
KMO	Kaiser's Measure of Sampling Adequacy
NNFI	Non-normed fit index
NGO	Non-Governmental Organization
PTE	Personal Teaching Efficacy
RMSEA	Root Mean Square Error of Approximation.
SD	Sustainable Development
TOE	Teaching Outcome-Expectancy
VIF	Variance Inflation Factor

CHAPTER 1

INTRODUCTION

1.1 Introduction

Today's generation has unfortunately been born into a world plagued by many problems, the number of which is increasing day by day (Hagglund & Samuelsson, 2009). Some of these problems are environmental, such as: pollution, global climate change, energy shortage, and CO_2 emissions (Gwekwerere, 2014). In addition to this, the world also faces problems which are social and economic in nature, such as rapid population growth, un-equal life conditions, child labouring, child marriage, setting barriers on girls' education, and immigration to more developed cities or countries which provide more job opportunities to earn money and survive (Gwekwerere, 2014). Researchers have stated that these environmental, social, and economic problems have occurred because of unconscious human interaction with nature, e.g. an increasing number of developments in technology, science, and health services (Dunlap & Jorgenson, 2012; UNESCO, 1997). In addition, such irresponsible human-nature interaction has given rise to many concerns regarding the Earth's natural capacity and resources for the future generations (Nevin, 2008; UNESCO, 2005).

This issue has led to the active participation of many developed countries, alongside academics and experts, in the studying of environment and humankind effects on nature. Firstly, the United Nations Education Program (UNEP) was established in 1972, and functions to protect nature and all living things within nature. Following this came the Intergovernmental Conference in Environmental Education, also known as the *Tbilisi Conference*; indeed, this was organised thanks to cooperation between the UNEP and the United Nations Education, Scientific and Cultural Organization (UNESCO) in 1977. The conference primarily focused on

Environmental Education (EE) and its necessity for the world's future (UNESCO, 1977). Based on the conference outputs, it was stated that there should be interventions, treatments, and governmental regulations pertaining to EE; in that way, it could be possible to make everyone aware of the environmental problems which affect the Earth. It was also stressed that education has a significant role and is a key factor when it comes to raising awareness of the environmental problems; indeed, education increases the likelihood that the next generation will protect, preserve and improve the environment, instead of only consuming and damaging it. In that way, it is possible to leave a liveable world for future communities (UNESCO, 1977). In addition to these organisations, with the support of UNESCO, the World Commission on Environment and Development (WCED) gathered and created the Brundtland Report in 1987 (WCED, 1987). The document focused on a concept which is a continuously growing and controversial issue in academic research. This concept is called "Sustainable Development (SD)", and is also considered a solution for socio-economic developmental and environmental problems (WCED, 1987).

According to the Brundtland report's description of sustainable development, it is a "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 43); indeed, SD is widely accepted by many academics, educators and institutions, despite the fact that it does not clearly reflect sustainable development and its components (Nevin, 2008). As such, Nevin (2008) emphasised that the definition of sustainable development actually refers to the need for a development which can be possible even without the overconsumption of nature's limited resources. The researcher also stated that environmental education studies, first discussed in the *Tbilisi Declaration* (1977), paved the way for actions towards sustainable development; with this said, however, being sustainable citizens and reaching sustainable development were not specifically analysed in the Brundtland report (1987).

Since the description of WCED (1987) did not obviously reflect the sustainable development with its major points, it was also described by UNESCO (2005) in the

context of the three important pillars of sustainable development: *economy, society, and environment*. Its components were essentially defined as: a) an environment pillar, referring to the utilisation of natural resources without damaging the environment; b) a society pillar meaning equal life conditions for everyone (Reinfried, Schleicher & Rempfler, 2007; UNESCO, 2005); and c) an economy pillar referring to "sustainable development of nature", as it is composed of natural SD pillars (Reinfried et al., 2007, p. 244). In order to accomplish SD, in 1992 the Rio Earth Summit was launched at the *United Nations Conference on Environment and Development* (UNCED) with participation from non-governmental organizations (NGOs), ministers of education, and 172 heads of state or governments. Agenda 21, which is a fundamental document, was also created at this conference (UNESCO, 1992), with emphasis placed on the role of education in sustainable development; in addition to this, the term "Education for Sustainable Development (EfSD)" was first uttered during the conference. It was argued that "Education, including formal education, public awareness and training should be recognized as a process by which human beings and societies can reach their fullest potential. Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues" (UNESCO, 1992, p. 3). In other words, education is the most useful tool when it comes to raising a society whose members are conscious of the requirements and principles of SD, which are crucial to achieving the concept itself. According to Venkataraman (2009), societal lifestyles could be changed and developed through education, thus allowing all societies to be able to adopt sustainable behaviours. Moreover, through EfSD, not only is environmental education provided, but focus is also on global issues, such as: poverty, society equality, peace, children's rights, democracy, and all socio-political issues (UNESCO, 2005). Thus, it is avowable to say that EfSD plays a crucial role in the transformation of a society and the goal of accomplishing SD.

As stressed above, EfSD is necessary to make people aware of the social, economic, and environmental aspects of SD, and to promote these aspects in order to guarantee sustainable behaviours which will benefit the future generations. Hence, in order to

reach this goal, EfSD should start during early childhood education (ECE), since it is a key step towards SD (Davis et al., 2008; Samuelsson, 2011); moreover, EfSD should be included in formal and non-formal education practices (UNESCO, 2008). Since there exist certain dilemmas related to the need for EfSD in the early years (Arlemalm, Hagser & Sandberg, 2011), many researchers have explained why EfSD is important and should be handled during ECE (Davis et al., 2008; Pramling, Samuelsson & Kaga, 2008; Samuelsson, 2011). Samuelsson (2011) stated that "…how children's thinking about the state of the world connects to the three pillars of sustainable development…" (p. 106); moreover, and Davis et al. stated that young children have "sophisticated thinking" abilities which are required for understanding SD issues (2008). This means that young children can evaluate their daily experiences in their surroundings, make connections between social and environmental issues, and criticise the results of their behaviours in terms of whether or not they are sustainable (Davis et al., 2008; Samuelsson, 2011).

In addition, "ECE is a highly gendered field" (Davis et al., 2008, p. 26). For instance, young children will probably be noticed for their contributions to society as future agents of the world if they are given SD education during ECE (Davis et al., 2008). Through EfSD in ECE, both boys and girls can be aware of their common responsibility to become conscious individuals who should collaboratively support the community's development in a sustainable way. Indeed, such behaviours, which target SD, remain stable if children are taught during their early years (Arlealm-Hagser & Sandberg, 2011). In addition to this, "A child has to be educated to become a global citizen" through EfSD teaching (Samuelsson, 2011, p. 111). In this way, all children can learn that every person is unique and has different views that differ from their own. Moreover, children can also learn that, just like adults, every child has a right to make their own choice as critics, problem solvers and contributors to society's development, even in the early years of their life (Samuelsson, 2011); this, again, is likely to occur thanks to the EfSD teaching of young children in ECE settings. Based on these reasons, it can therefore be re-concluded that EfSD practices implemented in ECE are one of the milestones of progress in communities' sustainable development in social, economic, and

environmental areas. In light of this, such practices must be included in daily activities during ECE.

Before making young children conscious of what SD is, and what SD roles are assigned to them in society, ECE teachers should first be trained in accordance with the purpose of EfSD (Kahriman-Öztürk & Olgan, 2016) before they begin to instruct. Samuelsson and Katz stressed that "*Teacher training* is central in the future development of ESD in early childhood" (2008, p. 10); moreover, Davis et al. (2008) noted that preparing pre-service ECE teachers for EfSD teaching is possible through a national and comprehensive curriculum implemented in the ECE teachers' training process in education faculties. At this point, in order to revise existing teacher education programmes, it is of increasing importance to examine what pre-service teachers believe about their SD and EfSD knowledge; in addition, it is vital to gauge what they believe about their competencies in planning and implementing EfSD-related activities in ECE settings. After establishing what pre-service ECE teachers report about their competence in SD, and their knowledge of EfSD and EfSD practices, it may be possible to revise pre-service ECE teachers' training programmes and course requirements by primarily focusing on SD issues (Gayford, 2001). However, instead of discussing SD-related issues as a separate subject or course, they can be integrated into the pre-service ECE teachers' training programmes (Björneloo et al., 2008). For example, the training process may focus on endowing pre-service ECE teachers with critical thinking, problem settling, and problem-solving skills, since these are accepted as key skills that are required to teach EfSD (Björneloo et al., 2008). In addition, since Samuelsson (2011) argued that young children must be raised as global citizens, the training process should guide pre-service ECE teachers to display global citizen behaviours, such as using renewable energy sources, saving natural sources, and guarding human rights in terms of equality, democracy and peace. By doing this, ECE teachers can be role models to young children in ECE settings (Arlealm-Hagser & Sandberg, 2011; Gayford, 2001; Kahriman-Öztürk & Olgan, 2016).

The training process of teachers should also focus on developing the attitudes, knowledge and self-efficacy beliefs of pre-service teachers (Richardson, 1996) as required by EfSD teaching. In the literature, attitudes are found to be effective in changing pre-service teachers' thinking skills, teaching practices, and classroom tasks (Pajares, 1992; Peck & Tucker, 1973; Richardson, 1994). Developing positive attitudes towards SD during the teacher education period may result in sustainable behaviours for the environment, economy, and society (Biasutti & Frate, 2016), as well as the implementation of SD-related activities in classrooms. In addition, knowledge which is accepted as "objective verifiable facts" (Valcke, Sang, Rots & Hermans, 2010, p. 622) and influences teachers' teaching activities in the classroom (Fenstermacher, 1994) is thought to have interaction with teaching processes (Adawiah & Esa, 2012). Through the knowledge they acquire in education faculties, pre-service teachers develop their "own vision" and "action-oriented" behaviours that will transfer to their teaching when they are in service (Sleurs, 2008). Considering all of these factors, pre-service teachers' visions, which have been shaped by EfSD, may be reflected in the knowledge and sustainability behaviours they adopt, and they might also choose to transfer this to the children.

Above all, beliefs which are known as motivational constructs (Valcke et al., 2010) were found to affect "the courses of action people choose to pursue, how much effort they put forth into given endeavours, how long they will persevere in the face of obstacles and failures…" (Bandura, 1997, p. 3). Considering the beliefs regarding these effects, the researchers who studied their impact on teaching found that they influence teaching performance and also determine classroom tasks depending on the level of self-efficacy (Tschannen-Moran & Hoy, 1998). The preference is for self-efficacy beliefs to be studied dimensionally as *outcome-expectancy* and *personal self-efficacy* (Bandura, 1977); indeed, outcome-expectancy has been central for many studies, because it is a determinant of teaching behaviours (Bandura, 1977). Moreover, self-efficacy beliefs could be predicted and explained by many factors, such as personal self-efficacy, attitudes, and knowledge (Olgan et al., 2014; Richardson, 1996; Valcke et al., 2010). At this point, it is important to address the teaching expectations of pre-service ECE

teachers in the context of EfSD teaching. In order to explain these expectations, many believe that it is vital to explain their contributions in terms of SD attitudes, SD knowledge and personal self-efficacy beliefs of EfSD teaching, and whether or not they contribute to outcome-expectancy beliefs for EfSD.

Of particular note, here is understanding natural experiences acquired during childhood which are found to be underlying motives that explain certain environmental behaviours of people (Hsu, 2009; Hungerford, Peyton & Wilke, 1980). In terms of this understanding, it has been stated that there exist some autobiographical factors which are developed during childhood and personal experiences throughout life which influence SD attitudes, SD knowledge and EfSD teaching beliefs (Tanner, 1980). According to Tanner (1980), the autobiographical factors that develop during childhood affect 'active and informed citizenry' related to environmental problems, and influence people's environment-conserving actions. The researcher also reported that "if we find that certain kinds of early experiences were important in shaping adults, perhaps environmental educators can, to the degree feasible, replicate those experiences in the education of the young" (1998, p. 399). Moreover, Chawla (1999) emphasised that the experiences which occur in natural areas have a strong effect on people's environmental behaviours. At this point, people who lived in urban areas during childhood may have positive attitudes towards the environment (Durkan et al., 2015) and towards SD; alternatively, people who lived in an apartment and city centre may have less knowledge about the environment and be insensitive to environmental issues. With regard to this aspect, the natural experiences which occur during childhood may have an influence on SD attitudes, SD knowledge, and EfSD teaching beliefs, including environmental issues.

All in all, in light of the related literature, this research intends to investigate pre-service ECE teachers' attitudes towards SD, SD knowledge, and self-efficacy beliefs for EfSD teaching. Moreover, the study aims to measure the roles of attitudes, knowledge, and personal self-efficacy in predicting pre-service ECE teachers' outcome-expectancy beliefs in relation to the teaching of EfSD. Lastly,

an additional goal of this study is to examine certain autobiographical factors which may have an effect on SD attitudes, SD knowledge, and self-efficacy beliefs for EfSD teaching.

1.2 Significance of the Study

A teacher, as the "most expensive and important source in any classroom" (Dean, 1993, p. 51) "… can make a difference, either positive or negative. If teaching does not make a difference, then the profession has problems" (Ornstein & Lasley, 2004, p.39). At this point, teacher education, which determines teacher quality and affects the teaching profession, should be receiving enough attention to make a difference to teaching effectiveness. Indeed, this expectation is related to the fact that teacher education has been found to have an impact on children's learning and achievement (Hattie, 2003).

In order to explain the importance of teacher quality and to suggest some revisions on teacher education programmes, certain researchers have examined pre-service teachers' effectiveness, and particularly how this is determined by their teaching self-efficacy beliefs. These researchers found that such beliefs have an influence on teaching performance (Gibson & Dembo, 1986; Tschannen-Moran & Hoy, 2001; Woolfolk, 2004). According to Bandura (1997), people with strong self-efficacy beliefs have a tendency to persist in solving any challenges they are confronted with. Moreover, since they recognise the problems as negotiable, they feel emotionally and physically healthy. Similarly, "Teacher self-efficacy is an important motivational construct that shapes the teacher effectiveness" (Pendergast, Garvist & Keogh, 2011, p. 46). This means that when teachers have a high level of self-efficacy beliefs, they teach better in the classroom (Pendergast et al., 2011). Furthermore, teachers with high self-efficacy beliefs are more deductive in their teaching and try to meet all students' needs, so that they can reach their potential (Pendergast et al., 2011; Stants, 2015). On the other hand, when teachers have a low level of self-efficacy, they do not push themselves to teach better and are unable to reach every child in the classroom (Pendergast et al., 2011). Hence, it can be important to prevent pre-service teachers from setting low self-efficacy beliefs, as

these are hard to change if they set them before they graduate (Tschannen-Moran, Woolfolk Hoy & Hoy, 1998). In order to achieve such prevention, teachers' self-efficacy should be examined and developed in the teacher education period, during which time they develop most of their self-efficacy beliefs (Hoy & Woolfolk, 1990; Mulholland & Wallace, 2001).

By explaining pre-service ECE teachers' self-efficacy beliefs, this research sheds light on the two components of self-efficacy beliefs, namely outcome-expectancy and personal *or* perceived self-efficacy (Bandura, 1997). According to related literature, outcome-expectancy beliefs may be explained by referring to personal self-efficacy (Bandura, 1986; Olgan et al., 2014; Richardson, 1996); in the present research, personal self-efficacy will be measured as one of the predictors of EfSD teaching outcome-expectancy beliefs (Tschannen-Moran & Hoy, 2001). Personal self-efficacy affects teachers' belief in their own ability to finish a certain task (Ashton & Webb, 1982; Bandura, 1986; Richardson, 1994; Wang, Li & Tan, 2017); indeed, this self-efficacy has been found to influence teachers' outcome-expectancy, which is classed as "judgements an individual makes about the likely consequences of specific behaviours in a particular situation or context" (Wang et al., 2017).

When the related literature was examined, it was clear that preparing pre-service teachers by using the environmental education (EE) course immediately increased their outcome-expectancy and personal teaching efficacy beliefs in teaching EE (Moseley, Huss & Utley, 2010). In addition, the pre-service teachers who had low perceived self-efficacy to teach EE were found to have high outcome-expectancy beliefs to teach EE (Sia, 1992). According to this result, the pre-service teachers believed that their efficacy in teaching EE influenced the children's EE learning (outcome-expectancy) (Sia, 1992). The literature also revealed that personal self-efficacy beliefs influence pre-service ECE teachers' science teaching outcome-expectancy beliefs (Olgan, Güner-Alpaslan & Öztekin, 2014) and EE teaching outcome-expectancy beliefs (Moseley et al., 2010). When the outcome-expectancy beliefs and personal self-efficacy of EfSD teaching are considered in the same

context, it is expected that personal self-efficacy beliefs will determine pre-service ECE teachers' EfSD teaching efficacy. It is inferred that this situation resembles a chain reaction; this is because pre-service teachers who believe they have an important role in EfSD teaching (outcome-expectancy) accordingly believe that their beliefs influence their teaching performance (personal self-efficacy); therefore, they have a potential to develop their teaching efficiency and probably implement classroom tasks focused on EfSD (Effeney & Davis, 2013). Thus, it is important to define and examine the impact of pre-service ECE teachers' personal self-efficacy on their outcome-expectancy beliefs, since they have a presumed role in influencing possible EfSD teaching behaviours. There exists only one study which has investigated the relationship between EfSD teaching personal self-efficacy and SD knowledge (Stants, 2016); however, there is no specific research relating to personal self-efficacy and outcome-expectancy in the context of EfSD teaching. As such, the present research will shed light on this important relationship.

As emphasised earlier, it is believed that personal self-efficacy affects people's outcome-expectancy beliefs; put simply, this is because what people choose to believe and expect as an outcome allows them to develop a sense of power and gain the competencies they need to finish the task (Bandura, 1986). In addition, those people who think that their behaviours, attitudes, knowledge or emotional states affect outcomes, are more likely to behave actively than those people who tend to perceive themselves as weak and perceive the events around them "fatalistically" (Bandura, 1986). Thus, it could be inferred that there exist other factors which may have an impact on outcome-expectancy beliefs; indeed, at this point, it is becoming increasingly important to reveal such factors, along with their existing levels (Bandura, 1986). Therefore, in addition to personal EfSD teaching efficacy, two more predictors (SD attitudes and SD knowledge) were investigated in order to define the extent to which they can explain the outcome-expectancy levels of pre-service ECE teachers regarding EfSD teaching.

The second predictor studied in the current study is pre-service ECE teachers' attitudes towards SD. Tomas et al. (2015) reported that even though there are programmes aimed at preparing pre-service teachers for EfSD, it is not guaranteed that those programmes will lead to future sustainability practices in their classrooms. However, the researchers emphasised that "there is a two-way relationship between attitudes and engagement" (2015, p. 327). As an example, they explained that if someone is engaged with science, this will most probably generate positive attitudes towards science, and those positive attitudes could be generalised to formal science education (Simon & Collins, 2003). Such a two-way relationship could also be possible between pre-service ECE teachers' high outcome-expectancy beliefs regarding EfSD teaching, and positive attitudes towards SD; indeed, this is because many researchers have found that attitudes determine the outcome-expectancy of pre-service teachers (Chong et al., 2010; Tschannen-Moran & Hoy, 2006). Searching the related literature revealed that negative attitudes towards SD/EfSD prevent sustainability implementations (Brennan & Cotgrave, 2013); in contrast, positive attitudes increase the sustainability practices (Kahriman-Öztürk, 2016). In addition, it was found that favourable SD attitudes have a relationship with favourable behaviours regarding EfSD/SD (Michalos et al., 2012). Moreover, an examination of self-efficacy beliefs revealed that they are highly correlated with attitudes towards science teaching (Demirel & Akkoyunlu, 2010; Olgan et al., 2014; Sarıkaya, 2008; Tekkaya, Çakıroğlu & Özkan, 2002), computer-aided instruction (Çetin & Güngör, 2012), and mathematics teaching (Akay & Boz, 2011; Ernest, 2006; Huinker & Madison, 1997). However, the relevant literature does not contain any study which has aimed to reveal whether or not SD attitudes predict outcome-expectancy beliefs regarding EfSD teaching. As such, the present research aims to investigate this important relationship.

Biasutti and Frate (2016) reported that quantitative measures intended to describe attitudes towards sustainable development (Michalos et al., 2012; Olsson, Gericke & Rundgren, 2015) were generally implemented with primary and secondary school students. In addition, such tools analysed only three aspects of SD, namely

environment, economy, and *society*, with the main focus being the environmental aspect of SD. These studies ignored the *education* dimension and did not place emphasis on investigating the education pillar of SD, which is one of the most significant pillars of EfSD. Thus, in their scales, they underlined the need for a measurement tool which quantitatively examines attitudes towards sustainable development and also handles the *education dimension of SD.* Biasutti and Frate (2016) therefore contributed a new dimension to the SD literature by introducing a new measurement tool, which was adapted and used in the current research; this tool is composed of items focused on the education pillar and the analysis of university students' attitudes towards SD. The researchers stated that more constructive analysis studies should be conducted to establish the new tool's validity and reliability. They stated that these studies should include a wide range of samples with different characteristics, educational settings, educational level and other variables, such as knowledge, environmental behaviours and self-efficacy. Within the relevant literature in Turkey, there exists no study which has examined the educational pillar of SD using an instrument which measures attitudes towards SD in reference to the educational aspect. Thus, the current study will fill this gap in the literature by proposing an adapted scale which can be used by those looking to study SD attitudes alongside the educational dimension.

The third predictor examined in the current study is SD knowledge, primarily because of the fact that previous studies pointed out the importance and predictor role of knowledge with regard to self-efficacy beliefs (Richardson, 1994, 1996). According to UNESCO Decade of Education for Sustainable Development, SD knowledge is an important factor when it comes to reaching sustainable living standards, and integrating said knowledge into higher education settings is required for EfSD in ECE (2005). Since SD knowledge is accepted as one of the most important competencies the teacher should have, pre-service teachers must be assessed before they graduate (OECD Education Ministers, 2005). From this perspective, developing pre-service ECE teachers' SD knowledge in higher education institutions gains importance; this is because such development also makes young children aware of SD-related issues (Kahriman-Öztürk, 2016).

Therefore, besides defining the predictor role of SD attitudes and their relationship with outcome-expectancy beliefs, the current research will examine SD knowledge and its possible impact on outcome-expectancy beliefs for EfSD teaching. Taking into account the literature, only a few studies have examined the SD knowledge of pre-service ECE teachers and its predictive role in implementing EfSD practices in teachers' classrooms (Kahriman-Öztürk, 2016). It was stated that the pre-service ECE teachers had a high level of SD knowledge because of taking courses or units related to SD (Effeney & Davis, 2013); moreover, the taking of these courses could predict the EfSD practices of teachers (Kahriman-Öztürk, 2016). In addition, a study conducted by Effeney and Davis (2013) revealed that there was a relationship between pre-service primary teachers' self-efficacy regarding their abilities in education related to sustainability and perceived SD knowledge. However, to the best of our knowledge, the current literature contains no study focused on the predictor role of SD knowledge in relation to outcome-expectancy regarding EfSD teaching. Therefore, the present research also has the potential to enlighten this important relationship.

In addition to the variables that aim to elucidate the outcome-expectancy beliefs of pre-service ECE teachers, one context which must be investigated is pre-service ECE teachers' autobiographical factors, which begin to be shaped during childhood and continue to be changed throughout adulthood (Tanner, 1980). Many researchers have argued that auto-biographical factors have an influence on people in many aspects, such as environmentally-responsible behaviours, environmental attitudes, environmental awareness, and sensitivity (Chawla, 1998; Gough, 1999; Palmer, Suggate, Bajd, Hart et al., 1998). Moreover, all of those factors were firstly studied by Tanner (1980) as "Significant Life Experiences". Tanner (1980) declared that the experiences which occur during childhood and nature develop love and respect for nature from childhood to adulthood, and affect the person's behaviours and approach to nature-related issues. For instance, a person's future behaviours concerning the environment are mostly influenced by lived location, such as village or city centre, type of housing lived in during childhood (such as flat or house with a garden), membership to non-governmental organisations, or reading journals

focused on environmental issues (Chawla, 1998; Hsu, 2009; Lewis, 2007; Tanner, 1980). Previous studies based on measuring autobiographical factors have generally studied, and found a correlation between, environmental sensitivity (Hungerford et al., 1980), responsible environmental behaviour (Shinichi et al., 2007) and environmental action (Hsu, 2009) if this correlation exists. Moreover, autobiographical factors have also been studied with different samples, e.g. environmental educators, environmentally-active citizens and college students, in order to analyse their experiences during their childhoods (Shinichi et al., 2007). Autobiographical factors were also studied with pre-service teachers, as well as high school and primary school students to gauge their influence on environmental attitudes (Andersen, 2004; Tuncer et al., 2004; Yılmaz, Boone & Andersen, 2004). Said factors were also studied by Kahriman-Öztürk and Olgan (2016) with ECE teachers, so as to explain their possible effect on EfSD practices. Finally, these factors were investigated with pre-school children in order to explain their environmental attitudes and awareness (Cohen & Wingerd, 1993; Durkan et al., 2015). Indeed, all of those studies concluded that autobiographical factors had a positive relationship with environmental attitudes and could serve as a determinant of environmental behaviours. Thus, because autobiographical factors have been accepted as important variables that affect people's attitudes, behaviours, and respect for the environment, they were also investigated in the current research through the use of certain autobiographical questions.

At this point it is fitting to address the exploration of all of these factors' roles when it comes to pre-service ECE teachers' outcome-expectancy beliefs related to the current teacher training programs for ECE teachers. Indeed, this can be reviewed in terms of developing their self-efficacy beliefs, attitudes, and knowledge, all of which could influence their readiness to teach the students in the context of EfSD.

Owing to each of the reasons stressed above, this study has examined SD attitudes, SD knowledge, and personal EfSD teaching efficacy as important key factors which affect the outcome-expectancy beliefs of pre-service ECE teachers in EfSD teaching. Moreover, investigation has also focused on whether pre-service ECE

teachers accept their influential role in EfSD teaching (outcome-expectancy). Finally, possible autobiographical factors that may have an effect on EfSD teaching self-efficacy beliefs, SD attitudes and SD knowledge were also searched.

The research questions tested in this study were:

1. What are the general patterns of pre-service ECE teachers' EfSD teaching self-efficacy beliefs, SD attitudes, and SD knowledge?
2. Do pre-service ECE teachers' SD attitudes, EfSD teaching self-efficacy beliefs and SD knowledge levels differ with respect to auto-biographical factors (grade levels, membership to a student club at university, childhood residence, and household type during childhood)?
3. How well do pre-service ECE teachers' personal EfSD teaching self-efficacy beliefs, SD attitudes, and SD knowledge predict their outcome-expectancy self-efficacy beliefs regarding EfSD teaching?

It was hypothesised that those pre-service ECE teachers who hold higher outcome-expectancy beliefs would have a stronger sense of self-efficacy beliefs, would develop more favourable attitudes towards SD, and would have more SD knowledge. Moreover, it was hypothesised that auto-biographical factors (grade levels, membership to a student club at university, mostly-lived location during childhood, household type during childhood) would have an influence on the participants' level of SD attitudes, EfSD teaching beliefs and SD knowledge.

1.3 Definition of Important Terms

Sustainability: "… relates to ways of thinking about the world, and forms of social and personal practice that lead to: ethical, empowered and personally fulfilled individuals; communities built on collaborative engagement, tolerance and equality; social systems and institutions that are participatory, transparent and just; environmental practices that value and sustain biodiversity and life-supporting ecological processes" (Hill, Wilson & Watson, 2003).

Sustainable Development: "… development that meets the need of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 43).

Education for Sustainable Development: "Education for sustainable development enables people to develop the knowledge, values and skills to participate in decisions about the way we do things individually and collectively, both globally and locally, that will improve the quality of life now and without damaging the planet for the future" (Sustainable Development Education Panel, 1998, p. 3).

Early Childhood Education for Sustainable Development (ECEfS): This aims to nurture socio-environmental resilience based on interdependence and critical thinking, setting foundations for lives characterised by self-respect, respect for others and the environment, the quality of their engagement with young children, and the early childhood community (Davis et al., 2008).

Sustainable Development Knowledge: This addresses "the cognitive sphere, the fact of knowing certain concepts" (Cebrian & Junyent, 2015, p. 2774), which is related to sustainable development's three pillars, namely society, environment and economy, and their components.

Attitudes: A psychological state that is conveyed through evaluating an entity with some degree of favour or disfavour and then expressing that evaluation (Eagly & Chaiken, 2007).

Self-Efficacy Beliefs: "beliefs in one's capabilities to organize and execute the course of action required to produce given attainments" (Bandura, 1993, p. 3).

Teaching Self-Efficacy Beliefs: "Teachers' belief or conviction that they can influence how well students learn, even those who may be difficult or unmotivated" (Guskey & Passaro, 1993, p. 4)

CHAPTER 2

LITERATURE REVIEW

This chapter includes information on the literature related to this study. The initial focus is on providing information regarding sustainable development (SD), the need for SD, education for sustainable development (EfSD) and its importance in ECE, with references made to the roles of educators. Following this, a theoretical framework of the study is provided, with reference made to self-efficacy beliefs and teacher self-efficacy beliefs. Subsequently, factors associated with self-efficacy beliefs and outcome-expectancy beliefs are provided. And lastly, attention is drawn to international and national studies conducted with pre-service and in-service early childhood teachers which measured SD attitudes, SD knowledge, autobiographical factors and EfSD self-efficacy beliefs; in addition, studies concerning outcome-expectancy beliefs regarding EfSD teaching are also examined.

2.1 The term Sustainable Development

This part includes information on sustainable development, alongside its dimensions and its goals.

2.1.1 What is Sustainable Development?

As stated in the above-mentioned definition, "sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 41). Examining the definition, it seems to include two key concepts of SD. First, it involves the 'needs', which refer to the "needs of the world's poor" (p. 41), whose requirements should be prioritised (WCED, 1987). Second, SD focuses on technological and societal developments, and how these should be followed by respecting nature's limits and those of current and future societies in order to meet their needs.

Upon defining SD in 1987, many researchers and organisations tried to extend its meaning by clarifying what it includes (Mebratu, 1998). Examining other definitions, it is seen that they are context based, and focus on different aspects of SD (Sağdıç, 2013). For example, while some are concerned with the economy pillar of SD (Elkin et al., 1991; Pearce, Markandya & Barbier, 1989), others focus on its society component. There also exist other definitions of SD, which are mostly interested in the environment and society pillars of the concept (Diesendorf, 1999). For instance, according to Diesendorf (1999), sustainable development "comprises types of economic and social development which protect and enhance the natural environment and social equity" (p. 3). In other words, social and economic development which is sustainable, mainly includes protecting the environment and social equality. The researcher also noted that economic development relates to "qualitative improvement in human well-being", and protecting the environment involves "keeping changes at non-catastrophic" (p. 4).

Interested in SD, UNESCO (2005) defined its three dimensions of *economy, society and environment*. First of all, as an integral part of SD, the economy pillar essentially includes: increasing conscious behaviours in public and decreasing the public's overconsumption. In addition, according to the economic perspective, SD concerns the continuous "maximization of welfare" by providing survival services such as "food, clothing, housing, transportation, health and education services" (Harris, 2000, p. 8). Moreover, an economically-sustainable system can prevent extreme production in agriculture and industry, which currently leads to imbalances in the economy when it is not under control (Harris, 2000).

Secondly, the society pillar addresses the actors which influence the social change and development of society, including: selected governments, civil organisations, nongovernmental organizations (NGOs), and "democratic and participatory systems" (UNESCO, 2005, p. 5). In addition, the society pillar also concerns certain issues which are directly affected by the above-mentioned actors and which most societies conflict with, such as: multiculturalism, social cohesion, equality, ethnicity, religion, security, poverty etc. Therefore, research related to the society

pillar notes that it is necessary to acknowledge people when talking about the problems which currently affect the world, and that these actors have a role in solving said problems. For instance, the public should recognize that "preferences for neoliberalism or the European social model will result in different social objectives" (Murphy, 2014); alternatively, selected democratic governments should place emphasis on respecting human's and children's rights, providing every citizen with equal health, education, and job opportunities, in addition to many more.

Lastly, the environment pillar intends to make people aware of the Earth's limited resources and the fact that people's behaviours have an impact on the environment (UNESCO, 2005). Moreover, it aims to show that people's behaviours, which affect the environment, correspondingly determine social and economic sustainability (UNESCO, 2005). The environment pillar functions by minimising air, water and soil pollution, while simultaneously reducing emissions and utilising resources. According to Harris (2000), an environmentally-sustainable system does not consume non-renewable energy sources, but commonly uses renewable resources by avoiding over exploitation. With help from the environmental system, the natural balance can be stabilised in terms of biodiversity, the atmosphere and the ecosystem.

In addition to the three pillars of SD identified by UNESCO (2005), Bossel (1999) reported that SD not only includes society, environment and economy pillars, but should also be seen as referring to cultural, political, ecological and even psychological aspects. Those scholars who have highlighted the effects of the political pillar of SD (Harris, 2000; Jacobs, 1995; O' Riordan, 1985) underlined the importance of selected governments, which have an important role in the economic, environmental and social developments of societies. The researchers also stated that the decisions made by politicians in terms of the innovations and changes implemented to develop society, influence the economic, environmental and societal development of that society. Simply put, similar to the three pillars of SD, the political pillar has an interaction with other dimensions of SD, and is also a dynamic and integrated part of the SD system (Jacobs, 1995; O' Riordan, 1985).

In addition to the political side of SD, another pillar which many have suggested should be considered part of SD is culture (Bossel, 1999; Burford et al., 2013; Nurse, 2016; UNESCO, 2012). Nurse (2016) concluded that culture is a missing dimension, and is based on the heritage and arts of each society. Besides this, culture involves the "whole complex of distinctive spiritual, material, intellectual and emotional features that characterize a society or social group" (UNESCO, 1982, p. 41). Significantly, it does not only involve arts, but is also composed of beliefs, values, human rights and traditions (UNESCO, 1982). In other words, since beliefs, values and traditions influence people's behaviours, the culture which encompasses all of them (Bossel, 1999) is "vital to humanize the development" and should be protected for future generations (UNESCO, 1982, p. 42).

In addition to the political and cultural sides of SD, many have suggested that the education pillar also falls under SD (Biasutti & Frate, 2016); indeed, this is investigated in the current study. The role of education in SD has been emphasised in many organisations (UNESCO, 2005, 2008; 2009, 2012), and mentioned in many chapters of Agenda 21 (1992). It was postulated that the education dimension should be viewed as making just as significant a contribution to SD as its other components (Biasutti & Frate, 2016); this is because, similar to other components, education also guides the people in gaining necessary skills, knowledge, behaviours, attitudes and many factors which support SD (UNCED, 1992; UNESCO, 2005, 2008).

2.1.2 The need for Sustainable Development

According to the DeSeCo report, "Globalization and modernization are creating an increasingly diverse and interconnected world" (OECD Education Ministers, 2005, p. 4); moreover, today the world faces many challenges related to societal, economic, and environmental issues. Thus, such societies should have features which help them to overcome the challenges with which they are confronted.

To properly process and overcome these challenges, communities should have some competencies to balance their economic, social, and environmental

developments; because "Sustainable development and social cohesion depend critically on the competencies understood to cover knowledge, skills, attitudes" (OECD Education Ministers, 2005, p. 4). Therefore, in order to have sustainable life conditions in the future and leave a world with adequate natural resources for future generations, the people must have the necessary knowledge and skills to be sustainably literate (OECD Education Ministers, 2005).

In terms of achieving this goal, Agenda 21 (UNCED, 1992) suggests that non-governmental organisations, every man and woman, and all organisations and women's groups should act together to accomplish SD at every level of society. The report also recommends that women should be involved in decision-making processes and ought to be empowered; moreover, indigenous people should be respected (UNCED, 1992). In addition to this, the report recommends the establishment of some communication mechanisms and learning centres for information exchange. In this context, the need for not only regional but also national and international cooperation is stressed, and the following major concerns are stated: decreasing poverty, establishing peace, protecting children's and human's rights, and ensuring social equality for each member of society.

After bringing all levels of society together to be part of SD applications, many have suggested that if every level of society is noticed for some principles, this results in SD (McKeown, 2002). For instance, one of the principles claims the following: to achieve SD, there must be social equality and justice amongst the citizens; in addition, there must be gender equality while providing economic, social and environmental opportunities to men and women (Harris, 2000; Nurse, 2016; UNESCO, 2005). Following this, there should be incentives for using sustainable energy sources which contribute to economic and environmental development, and which sustain the environment (OECD, 2005 Education Ministers; UNCED, 1992). Furthermore, it is suggested that equal health, education and security service be provided to each member of society, to protect the environment "from the street corner to the stratosphere" (Cooper & Palmer, 1992, p. 165); additional purposes of this philosophy include: keep all eco-systems alive

as much as possible by protecting the diversity of species, use renewable energy sources, feed starving people, and sustain those actions in all societies so that SD becomes the world's common interest (WCED, 1987). Lastly, it has been asserted that education is the most useful tool with which to achieve the above-mentioned goals (UNESCO, 2005), since it influences sustainability actions in three areas: implementation, decision-making and quality of life.

In conclusion, it is widely accepted that SD comprises three pillars (UNESCO, 2005), namely society, environment and economy, although there exist other pillars which scholars have proved contribute to SD, such as politics, culture and education (Biasutti & Frate, 2016; Harris, 2000; O' Riordan, 1985). Contrary to many studies which concentrated solely on the three pillars of SD, the current research also focused on the education aspect of SD, which was first presented by Biasutti and Frate (2016). Researchers emphasised combining the dimensions of SD and considering each dimension as working as a whole machine, since they are interrelated and have a holistic construct (Summers & Childs, 2007). Therefore, current study tends to examine the education pillar as one of the components of SD which is interrelated with the others. In addition to these factors, in this part it was noted that SD depends on providing equal environmental, economic and social opportunities to every member of society through the active participation of men, women, NGOs, and institutions (OECD Education Ministers, 2005; UNESCO, 2005; WCED, 1987).

2.2 The term Education for Sustainable Development

This part provides information relating to education for sustainable development, and its importance.

2.2.1 What is Education for Sustainable Development?

Nelson Mandela once stated that "Education is the most powerful weapon which you can use to change the world" and is the best tool with which to change human behaviours, attitudes, values and skills (OECD Education Ministers, 2005). In this context, education plays a significant role in actualising a "vision of sustainability

that links economic well-being with respect for cultural diversity, the Earth and its resources" (UNESCO, 2007, p. 6).

According to Nevin (2008), although there is debate surrounding the matter, it can in fact be said that EfSD is composed of environmental education (EE) and development education (DE). According to the researcher, EE is focused on ecological issues. It deals with protecting the environment and decreasing the harmful effects of humankind on nature. Furthermore, DE is mostly concerned with the social side of SD, which aims to develop social living conditions by, for example, protecting human rights and peace. Furthermore, DE serves to provide problem solving and critical thinking skills, knowledge, attitudes, and behaviours which are essential for SD. Besides this, EfSD is a process which aims to encourage people to change their lifestyles for the social, economic and environmental well-being of societies through education (Hopkins & McKeown, 1999). It involves many themes which are mostly concerned with environmental issues (Nevin, 2008). Other cornerstones of EfSD include poverty, race, peace, human rights, democracy, multiculturalism, and many social, cultural and economic issues (Mebratu, 1998; Murphy, 2014; Nevin, 2008; Venkataraman, 2016). Likewise, EfSD touches other underlying factors; indeed, local and global issues play a role in SD, be them political or cultural (Harris, 2000; Sağdıç, 2013; UNESCO, 2008). Integrating all pillars into educational settings makes it possible to develop the necessary equipment, thus enabling individuals to contribute to SD (UNESCO, 2008). To conclude, as an education tool used to achieve sustainability, EfSD "calls for giving knowledge and skills to people for lifelong learning to help them find new solutions to their environmental, economic and social issues" (McKeown, 2002, p. 7).

Simply providing more education to societies does not result in SD, and this education should be reoriented according to the context of the pillars of SD (Hopkins & McKeown, 1999; McKeown, 2002). As stated by McKeown (2002), most educated nations damage nature more, because their ecological footprints are more extreme than others, and leaving large ecological footprints on nature is related to consumption. To exemplify, the statistics have revealed that, compared

to many developed countries, the United States is home to highly educated people; however, energy consumption and waste generation levels are very high in comparison to other countries (McKeown, 2002). Unfortunately, this indicates that simply educating people is not enough to accomplish SD. At this point, EfSD gains importance. As previously mentioned, EfSD not only "encompasses environmental education but sets it in the broader context of socio-cultural factors and the socio-political issues of equality, poverty, democracy and quality of life" (Venkataraman, 2016, p. 8); moreover, EfSD aims to increase the welfare of society by making economic investments which take into consideration the world's limits (UNESCO, 2005).

In the context of the knowledge provided above, in order to initiate EfSD, UNESCO organised the Decade of Education for Sustainable Development (DESD), 2005-2014, which involved stating the essentials of SD itself. The organisation aimed to change society through quality education, and to move us towards a sustainable future; the organisation also wanted to emphasize the collaborative work of "stakeholders from government, private sector, civil society, non-governmental organizations and the general public" (Nevin, 2008, p. 52). It was reported that a key task when it comes to achieving sustainability is to reorient curricula from the pre-school level to the university level, in order to endow people with a basic grasp of SD. Furthermore, building public awareness and providing practical training to all sectors are the priorities of EfSD (UNESCO, 2005).

Before DESD, the priorities for EfSD were firstly defined in Chapter 36 of Agenda 21 (McKeown, 2002). According to the document, there are four thrusts which are key to pushing EfSD forward, namely: 1) promoting basic education, 2) reorienting curricula concerning the dimensions of SD, 3) making the public conscious of SD-related issues, and 4) training (UNCED, 1992).

The priorities of EfSD were examined thoroughly in *Education for Sustainable Development Toolkit*, created by McKeown alongside certain researchers specialising in SD. According to the toolkit, the first priority, basic education, includes compulsory education (McKeown, 2002) which is tentative in terms of

schooling age in all countries. With respect to the toolkit, the basic education process intends to raise the future agents of society – the children – from the early years (McKeown, 2002) to have values, skills, knowledge and behaviours regulating social life (UNCED, 1992). Thus, the toolkit should be reoriented to bring in problem solving and critical thinking skills, using and interpreting the information, and analysing the social, economic and environmental issues that are integral parts of SD (McKeown, 2002). This is because such skills are accepted as important competences that every young member of society should earn with basic education, in order to be successful in life (OECD Education Ministers, 2017). In this context, when the basic education is provided by the state from the early years, and covers a large part of the education process, many individuals in society will become conscious citizens who are equipped with these competences. Moreover, a society full of conscious citizens raises conscious children, as it acts as a good role model for them; in addition, the gender gap will also be filled, with people enrolling their girls in school etc. Lastly, it has been said that basic education should be separated from EE, which is only a part of EfSD (McKeown, 2002; Nevin, 2008).

The second priority, reorienting existing curricula, involves integrating SD-related issues into basic, secondary and higher education institutions (McKeown, 2002). Similar to basic education, it has been suggested that, while reorienting education curricula, programme developers should take into consideration the knowledge, behaviours, values and attitudes that lead people to act sustainably. In addition, higher education programmes which prepare the university students in all sectors of society are the closest future leaders of society; thus, it has also been proposed that faculty members should deal with sustainability issues on their courses (McKeown, 2002).

The third priority includes public understanding and awareness of SD, and requires educating society in terms of health services, consumption behaviours and voting (McKeown, 2002). For example, in order to reach sustainability goals, voting citizenry should be aware of which government would be best in terms of achieving SD. Moreover, the society should be careful about the "greenwash", as this can

cause people to display unintentional yet environmentally-irresponsible behaviours. With respect to the third priority, the public must also be informed of the diseases and medications that will probably prevent common diseases (McKeown, 2002).

The fourth and last priority of EfSD is training, which essentially intends to train all sector leaders and sector members playing an important role in the implementation of the SD policies (McKeown, 2002; UNCED, 1992). With regard to this priority, it is noted that training helps show "workers how to use equipment safely, be more efficient, and comply with regulations (e.g., environmental, health, or safety)" (McKeown, 2002, p. 16). By doing this, a factory labourer who avoids informing his/her employer about changes in the waste stream will learn that extraordinary changes in waste streams may cause environmental pollution, and thus there should be certain interventions in place to tackle said issue. Moreover, in addition to workers, employers also learn the procedures and regulations which they should bear in mind while carrying out certain tasks.

2.3 Education for Sustainable Development in Early Childhood Education

When EfSD and its place in ECE is examined, it is clear that there have been many attempts to bring EfSD into ECE (Effeney & Davis, 2013). With this said, however, there is a need for research to define what and how young children should be taught through EfSD (Davis, 2009). At this point, and as stated by Engdahl and Rabusicova (2010), young children may be taught skills including inquiry learning, creative thinking, experiential learning and problem-solving, all of which are required for shedding light on the social, cultural, political, economic and environmental challenges experienced by all societies. In addition, in order to develop competences which function for SD, young children could also be educated on the environment, nature, and all living things on Earth, since all of these are connected with sustainability (Arlealm-Hagser & Sandberg, 2011). Furthermore, although there is controversy surrounding whether or not young children are mature enough to understand SD-related issues, research has revealed that they are actually mature enough to gain skills for EfSD and recognize SD (Reunamo & Suomela,

2013; Samuelsson, 2011; Siraj-Blatchford, 2007); indeed, this is not a concept which has been assessed in education policies, but is instead shaped around an ecological concept and must be practised in ECE settings (Arlealm-Hagser & Sandberg, 2011). Therefore, it is avowable to say that, considering the above-mentioned reasons, the issue of what aspects of EfSD should be involved in ECE practices, and how this should be achieved, ought to be the concern of the policy makers, teachers and researchers.

In order to guide early childhood educators and teachers, there are certain implications that scholars have suggested can be used in ECE institutions. The best way to integrate EfSD into ECE practices is possibly through the *7Rs*; as presented by Samuelsson and Kaga (2010), these are "respect, reflect, reduce, reuse, repair, recycle and responsibility". According to the researchers, these seven notions may be focused on daily activities; in that way, all components of SD can be handled. Moreover, the content and practices related to EfSD must be synchronised; that is, they should be implemented in harmony.

As the researchers stated in their report, entitled "State of the World: Transforming the Cultures, from Consumerism to Sustainability" (Samuelsson & Kaga, 2010), while focusing on the 'reduce' notion, activities may be related to overconsumption of natural resources. Moreover, today's everlasting consumption patterns which emerge from advertisements may be discussed with parents, since this could prevent children from engaging in such overconsumption behaviours. In addition, the 'reuse' notion could be implemented through activities which focus on using the materials for different purposes again and again, at home and school. In addition, the 'recycle' concept would be addressed by having the children acknowledge the recyclable materials they use in daily life. After learning about these recyclable materials, the children can be encouraged to collect and bring those materials to ECE settings and reuse them in a range of activities or recycle them. Additionally, the 'repair' concept could be embraced by repairing broken materials, such as toys. By doing this, the children can learn that they do not always have to buy new toys, and can fix their existing ones. With regard to the notion of 'respect',

the children can be encouraged to protect nature, avoid unconscious behaviour which violates nature, and respect nature itself. Moreover, with regard to 'responsibility', children can be empowered to take responsibility for tasks or something which makes them happy and self-confident. Lastly, "reflect is a habit and skill everybody benefits from in working for sustainability" (Samuelsson & Kaga, 2010, p. 59).

It may be noted that, similar to SD components, the seven above-mentioned notions are dynamic and interact with each other. In this way, when the children 'recycle' the materials, they 'reuse' said materials for different purposes at the same time. Moreover, when the children are taught to collect and throw recyclable materials into appropriate bins, they 'respect' nature and learn about the 'responsibility' notion accordingly. Likewise, when the children 'repair' their toys, they learn about the 'reduce' concept, which is focused on encouraging children to acknowledge the need to reduce overconsumption behaviours.

2.3.1 The role of Early Childhood Educators in Education for Sustainable Development

There is a challenge for early childhood teachers to develop pedagogic practices that form behaviours related to the sustainable development of society from the early years (Siraj-Blatchford, Smith & Samuelsson, 2010). As stated previously, it is significant to acknowledge that children can adopt sustainability behaviours that will remain stable if they are taught earlier. However, raising children in an appropriate manner depends on the teachers' preparedness to teach EfSD; therefore, it is significant to develop competence in children through EfSD, which is taught by trained teachers. This is also important because of the fact that training pre-service ECE teachers makes them aware of sustainability issues and helps them to support the skills that children require for SD (Samuelsson, 2011). By taking a comprehensive approach to ECE teachers' training, which is implemented before they serve, it may be possible to integrate sustainability issues into daily practices in ECE settings, rather than teaching this as a separate subject (Björneloo et al., 2008).

In this context, related literature has shown that pre-service and in-service ECE teachers recognize the necessity of sustainable development (SD), environmental education (EE) and education for sustainable development (EfSD); however, they also face challenges when they start to put their training into practice (Flogaitis & Agelidou, 2003; Kahriman-Öztürk & Olgan, 2016). They need to learn the pedagogy of EfSD, so that they become competent in EfSD teaching (Samuelsson, 2011); indeed, this is because "Developing ESD capability also involves pedagogical development" (Björneloo et al., 2008, p. 38) and ECE teachers play an active role in encouraging children to acknowledge the SD concept (Davis, 2010). Following a review of the related literature, it was noticed that most of the studies focused on the teachers' background, thoughts, understanding and comprehension of EfSD or SD, since it is important to identify these aspects (Arlealm-Hagser & Sandberg, 2011; Björneloo, 2007; Dyment et al., 2014; Dyment & Hill, 2015; Flogaitis & Agelidou, 2003).

In their study, Flogaitis and Agelidou (2003) aimed to examine how teachers define EfSD and involve themselves in EE practices, which are part of EfSD practices. The researchers (2003) found that a small portion of the teachers understood what EfSD is and stated that EfSD is about encouraging children to display sustainability behaviours which can provide a sustainable future. In addition, the researchers reported that some of their participant teachers did not have enough knowledge about the environment and environmental issues; therefore, they admitted to not feeling competent in implementing EE practices in the classroom. With respect to the results of this study, the authors proposed that in-service training be revised in terms of EE practices, so that the teachers learn about the environment and implement EE practices in the classroom.

Moreover, in an experimental study conducted by Dyment et al. (2014), the researchers intended to define how the professional development of early childhood educators influenced their confidence, understanding and knowledge of EfSD. Before implementing professional development (PD) sessions, the researchers asked participants to complete a questionnaire which included questions about their

content knowledge, understanding of and confidence level related to EfSD. Additionally, the participants were invited to list the words that sprang to mind when they thought about sustainability. The same procedure was also applied after the PD sessions. Their results indicated that, before PD sessions, the pre-school teachers reported having weak content knowledge and a low level of confidence in EfSD. Likewise, they understood EfSD only in terms of its environment dimension. On the other hand, after the teachers engaged with EfSD, there was an increase in both their knowledge and level of confidence in teaching EfSD. Due to their results, the researchers concluded that pre-service and in-service ECE teachers should be provided with PD sessions to make them capable of implementing SD concepts in eco or ordinary schools.

Similar to the above-mentioned study, an investigation by Dyment and Hill (2015) examined pre-service teachers' perspectives on the sustainability of cross-curriculum priority (CCP). With this purpose in mind, they gauged the participants' understanding of sustainability by asking them to list five words that sprang to mind when they thought of sustainability. Furthermore, the pre-service teachers' tendency to apply sustainability practices was measured by asking them to discuss their competence, confidence, learning opportunities and willingness in relation to the sustainability of CCP. Their findings showed that the pre-service teachers had limited learning opportunities, competence and confidence to integrate sustainability into practice. Moreover, and similar to previous research results (Dyment et al., 2014), the pre-service teachers mostly stated words related to the environment dimension of sustainability. What is more, and most significantly, the pre-service teachers recognised the importance of teaching SD notions in practice and displayed willingness to employ EfSD practices. With respect to their results, Dyment and Hill (2015) acknowledged the role of initial teacher education and higher education, and suggested the integration of SD issues into the cross-curriculum.

Another qualitative study conducted by Arlealm-Hagser and Sandberg (2011) aimed to analyse ECE teachers' comprehension of SD and their EfSD practices. In

contrast with previous studies, the teachers being surveyed were engaged with a course focusing on SD issues and implementation in ECE settings. Hence, unlike previous literature findings, the results of their study revealed that ECE teachers recognised that SD comprises three dimensions, as well as the components of these dimensions, all of which function as a whole. In addition, the teachers reported that they were comfortable with planning, implementing and integrating SD into children's daily activities.

2.4 Theoretical framework of the study

The theoretical background of this study is focused on Social Cognitive Theory, which was put forth by Bandura (1986) and which has long been preferred when explaining teachers' self-efficacy beliefs and the importance of self-efficacy in teacher education.

2.4.1 Social Cognitive Theory

This study is developed around the theoretical framework of self-efficacy beliefs, which was constructed using Bandura's Social Cognitive Theory (1986). The theory explains that "behavior, cognitive and other personal factors, and environmental events all operate as interacting determinants of each other" (Bandura, 1986, p. 18). In other words, these three factors function reciprocally and triadically. Bandura (1986) indicated that people are the determiners of their own choices and the outcomes of their behaviours, and that what they willingly do determines their agency in social life. At this point, self-efficacy beliefs play an important role in constructing human agency (Bandura, 1977), which is composed of cognitive, motivational, affective and selection processes (Bandura, 1986).

Beginning with cognitive processes, there are various factors which affect the cognitive processes of people, such as personal goal setting, problem solving skills and self-efficacy development (Bandura, 1986). The goal setting involves capabilities to self-evaluate. For instance, if the person has high personal self-efficacy beliefs, he/she could set higher and challenging goals and feel committed to them. The problem-solving skills refer to people recognising and predicting the

problems which may arise while performing certain tasks, so that they can find solutions and control them. These skills also cover analytic thinking – a process during which the person becomes aware of the problems, finds solutions for them, solves them, observes the results of their problem-solving actions, and remembers whether or not this process worked. The cognitive processes also focus on self-efficacy development, because this process requires strong self-efficacy development to manage the challenges, failures and other external factors which impact people's resilient sense of self-efficacy (Bandura, 1995).

Secondly, the motivational process pertains to the role of self-efficacy beliefs in managing motivation (Bandura, 1995, 1986). It is related to making effort and being resilient to failures. To exemplify, when people are confronted with obstacles, those who have strong self-efficacy beliefs persevere until they have accomplished the task; in contrast, those with low self-efficacy beliefs quit the task without struggling with it.

Thirdly, the affective process is related to the role of coping with the efficacy beliefs of people when they experience difficulties, stress, depression etc. (Bandura, 1995). Finally, in the selection process, which regulates human agency, "destinies are shaped by selection of environments known to cultivate certain potentialities and life-styles" (Bandura, 1995, p. 10). Furthermore, people stay away from the environments and tasks which challenge their coping abilities.

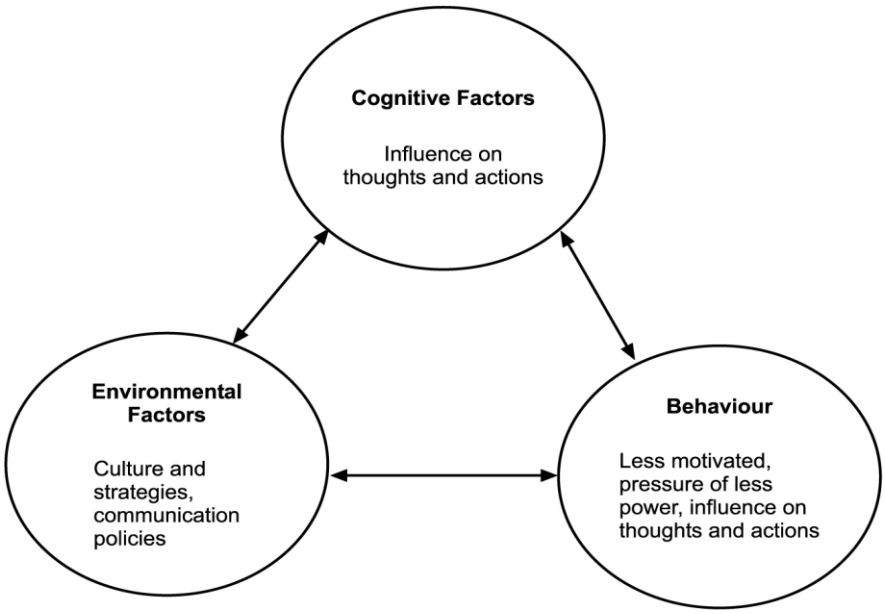


Figure 2.1 *Schematisation of the relations between the three determining factors in triadic reciprocal causation.*

Apart from human agency and the processes which constitute human agency, there exists a reciprocal determinism, which is the third main concept of the theory; this third concept is defined as a model of the factors which influence the behaviour: *the individual, the environment and the behaviour itself* (Bandura, 1986). This model, put forth by Bandura, emphasises personal characteristics and social environment, with many stimuli affecting the behaviour and being affected by the behaviour itself (see Figure 2.1). In reciprocal determinism, which is triadic, there is a mutual relationship between these three factors. As seen in Figure 2.1, the behaviour, cognitive processes and personal characteristics have a triadic relationship and function interactively.

In addition, there are other core components of Bandura's theory, namely outcome-expectancy and perceived self-efficacy, and constructing self-efficacy beliefs (Pajares, 1992). It has been asserted that "the people are motivated to perform an action if they believe the action will have a favourable result" (Bleicher, 2004, p. 384); this is called outcome-expectancy. Moreover, these people believe that such action will end in success, which is known as perceived self-efficacy (Bleicher,

2004). In addition, these dimensions of self-efficacy beliefs are influential factors when it comes to career choice, changing risk behaviours, adopting new behaviours, stressful life transitions and educational development (Bandura, 1995).

To sum up briefly, self-efficacy beliefs play a role in human agency, the processes that constitute human agency, and those processes related to reciprocal determinism; self-efficacy beliefs primarily encompass two dimensions, namely perceived self-efficacy and outcome-expectancy.

2.4.2 Self-efficacy Beliefs

In the literature, self-efficacy beliefs have been researched by many scholars in different ways, using various constructs; hence, there are many definitions of self-efficacy beliefs. Pajares (1992) stated that these beliefs have a "messy construct" (p. 307), are hard to study, and must be examined using a variety of definitions, so as to conduct a worthy study; he also stated that it is not possible to observe the beliefs, although they are open to measure. Moreover, the researcher concluded that these beliefs should be separated from other psychological constructs.

Bandura defined self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (1997, p. 3). Alternatively, Richardson (1996) reported that beliefs are psychological constructs and premises that encourage people to believe that they are true. In addition to these definitions, Pajares (1992) described self-efficacy beliefs as an "individual's judgment of the truth or falsity of a proposition, a judgment that can only be inferred from a collective understanding of what human beings say, intend, and do" (p. 316).

Although there are many definitions of beliefs, Borg (2001) claimed that there are common points in the descriptions. Indeed, the scholar pointed out that these beliefs have four main characteristics, namely *"the truth element"*, *"the relationship between beliefs and behaviour"*, *"conscious versus unconscious beliefs"* and *"value commitments"*.

In explaining *the truth element*, Borg (2001) stated that this is a key difference

between the beliefs and the knowledge; this is because, while some hold beliefs that are accepted as true for them, others can hold alternative beliefs that better fit their mental state. In other words, the beliefs are not labelled as "true", but change from person to person, although the knowledge can be recognised as true in some external senses. With regards the second characteristic, namely *"the relationship between beliefs and behaviour"*, Borg (2001) stated that self-efficacy beliefs commonly affect the decision-making processes and actions of people. In terms of the third character of beliefs, which is *"conscious versus unconscious beliefs"*, the researcher indicated that there is disagreement in the definitions regarding whether or not the people are aware of their beliefs for their self-efficacy in certain tasks; he also emphasised that there are some beliefs which people are mostly aware of and also unconscious beliefs that can be examined through studies which measure self-efficacy beliefs. With regard to the fourth and last characteristic of beliefs, namely "*value commitments*", Borg (2001) concluded that the beliefs are organised by "emotive commitment", as the word "belief" actually originated from an Aryan word, "lubh", which means "to love or like".

Moreover, in one of his famous books, entitled "Social Foundations of Thought and Action", Bandura (1977a) stated that "people regulate their level and distribution of effort in accordance with the effects they expect their actions to have. As a result, their behavior is better predicted from their beliefs than from the actual consequences of their actions" (p. 129). In light of this, it is essential to study the self-efficacy beliefs of teachers in order to predict their possible behaviours based on EfSD teaching in the classroom.

2.4.3 Self-efficacy Sources

Bandura (1995) noted that self-efficacy beliefs can be improved via four sources, namely "*mastery experiences"*, *"vicarious experiences"*, *"social persuasion" and "physiological and emotional states"*.

First, Bandura explained *mastery experiences* as "the most effective way of creating a strong sense of efficacy" (p. 3); moreover, he added that while success in a certain

task strengthens a person's self-efficacy beliefs, failures damage a person's self-efficacy beliefs. Bandura also emphasised that easily-achieved successes make people expect certain and quick results, which leads to discouragement when the person fails; therefore, if the person is faced with numerous difficulties and obstacles, he/she will probably maintain spending effort until said difficulties and obstacles have been overcome; this also means that they will build strong self-efficacy beliefs when they finish the task successfully. If the person discovers that he/she has the necessary capabilities to succeed in difficult tasks, he/she will build a high level of self-efficacy beliefs.

Vicarious experiences constitute the second source in constructing self-efficacy beliefs; this concept simply means that if one person observes that other people who display "perseverant effort" can reach their goals, then the observer encourages him/herself, as he/she also has the same capabilities and can succeed in similar tasks with all-out effort. In contrast, if the person observes that people similar to him/her can be unsuccessful even if they exert a great deal of effort and struggle with the task, he/she will feel discouraged and his/her level of motivation will decrease. Bandura (1997) stated that the influence of the model the person observes is related to the observer's perception of how similar he/she feels he/she is to the model person; indeed, the scholar concluded that if the perceived similarity between the observer and model increases, the effect of modelling on the observer also increases, and this better determines the successes and failures.

Third, self-efficacy can be strengthened with *social persuasion*. With regard to *social persuasion,* people are convinced of their capabilities and verbally encouraged to finish the task they want to achieve. Even if the person has doubts about him/herself when the difficulties arise, verbal persuasion boosts him/her to force him/herself to work better. In this way, the person builds a high level of self-efficacy beliefs. Bandura (1995), however, stressed that it is hard to convince people to build high beliefs through social persuasion, since there may be exaggerated boosts for the person's efficacy; such unrealistic boosts cause people to undermine their own beliefs when the failures occur.

Physiological and emotional states constitute the third way of potentiating the self-efficacy beliefs. People who construct their self-efficacy beliefs with *physiological and emotional states* tend to reveal tension and stress reactions, since they are sensitive if they have exhibited poor performance. As stated by Bandura, in physical activities that require a strong and healthy body, those people who have exhibited weak performance start to complain about headaches, pains and illnesses. In addition to this, since the self-efficacy beliefs are psychological constructs of beliefs (Pajares, 1992), mood is also an influential factor in the construction of said beliefs. For instance, when a person is in a positive mood, he/she improves his/her perceived self-efficacy, although a negative mood undermines it. Bandura (1997) stressed that in order to change low efficacy beliefs which emerge from weak physiological and negative emotional states, the person should make his/her body and health stronger, while decreasing the stress as much as possible.

2.4.4 Teacher self-efficacy and its sources

It has been claimed by many researchers that self-efficacy beliefs have an influence on people's decision-making processes throughout their lives (Bandura, 1986; Brown & Cooney, 1982; Dewey, 1933; Pajares, 1992); moreover, there is a chance to manipulate the teachers' self-efficacy beliefs during teacher education before they form their "philosophical contemplations" (Pajares, 1992). Since these beliefs can also affect the pre-service and in-service teachers' behaviours in the classroom and help them to develop their professional identity (Beijaard, Meijer & Verloop, 2004), many researchers have argued that these teachers should be developed and mentored by their lecturers during their teacher education and practising (Ashton, 1990; Brookhart & Freeman, 1992; Fenstermacher, 1979; Tabachnick, Popkewitz & Zeichner; Wilson, 1990). In addition to this, Pintrich (1990) postulated that the beliefs are the most important psychological construct in teacher education; therefore, it is necessary to examine what today's pre-service teachers believe about their efficacy for teaching.

Pajares (1992) argued that the majority of students who enter the workplace are unable to implement the theories they learned during higher education.

Furthermore, many students, when encountering their real work, are faced with "unexpected surroundings". Since they are new to such surroundings, they recreate the pre-determined meaning of their possible working places which they formulated in their mind before starting work. Pajares (1992) also informed that adopting new beliefs happens when the person respectively rejects the new beliefs, accepting them later and changing the existing beliefs; this situation can also be seen as accommodating new beliefs.

Teaching efficacy has been described as "… the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (Tschannen-Moran & Hoy, 1998, p. 233). Kagan (1992) declared that teachers' teaching beliefs filter the new knowledge and experiences; moreover, in this context, the beliefs affect the teachers' future lesson plans, behaviours in the classroom and attitudes towards students.

Teacher efficacy also influences teachers' motivation to teach, their effectiveness during teaching, and their behaviours and attitudes towards students in classroom settings (Pendergast, Garvis & Keogh, 2011); as such, it is important to examine and develop pre-service teachers' self-efficacy to teach before they start to educate the students. In addition to this, teacher self-efficacy was found to be related with students' success (Ross, 1992) and to play a determining role in promoting resilience in terms of exerting more effort to help students who need extra attention (Gibson & Dembo, 1984).

Many researchers (Nespor, 1987; Pajares, 1992; Rokeach, 1968) have noted that self-efficacy, which is a sub-construct of beliefs, should be carefully studied by educators. Since self-efficacy has a broader structure, it should be examined by being interconnected with other substructures of beliefs, such as values, or cognitive domains, such as attitudes and knowledge. Therefore, the current study sought to address the following issue: whether or not pre-service ECE teachers' EfSD teaching self-efficacy is interrelated with their SD knowledge and SD attitudes, which are accepted as cognitive domains. As also concluded by Pajares

(1992) and Tschannen-Moran et al. (1998), studies concerning the examination of self-efficacy beliefs should be "context-specific", because of their multidimensionality. Along these lines, the current study focused on SD and EfSD contexts, and examined, in detail, the self-efficacy beliefs of pre-service ECE teachers.

2.5 Factors Associated with Self-Efficacy and Outcome-expectancy Beliefs of Teaching

There are many factors associated with teacher efficacy, such as gender (Ghaith & Shaaban, 1996; Shim, 2001; Yılmaz, Tüzün & Topçu, 2013), commitment to teaching (Chacon, 2005; Coladarci, 1992), student achievement (Armor et al., 1976; Yılmaz, Tüzün & Topçu, 2013), mentors (Zeichner, 1980), attitudes (Ajzen, 1991; Bandura, 1993), and knowledge (Smylie, 1988). In addition, there exist variables that influence the pre-service and in-service teachers' self-efficacy and outcome-expectancy beliefs in many contexts; indeed, these variables have been the focus of this section.

2.5.1 Attitudes

One of the factors which was found to be associated with teacher self-efficacy (Pajares, 1992; Richardson, 1996) and teaching outcome-expectancy beliefs is attitudes. Attitudes and teaching self-efficacy beliefs, including outcome-expectancy and perceived self-efficacy, are two important factors, and play a significant role in "understanding teachers' thought processes, classroom practices, change and learning to teach" (Richardson, 1996, p. 1) in either pre-service or in-service. Attitudes and teaching outcome-expectancy beliefs are considered to be important factors which determine what and how pre-service and in-service teachers desire to learn and teach (Richardson, 1996). Attitudes stimulate the beliefs (Ajzen, 2005) and similarly, outcome-expectancy beliefs towards teaching are stimuli of the likelihood that behaviours are aimed at a specific purpose (Maddux, Sherer & Rogers, 1982). Therefore, it is crucial to understand how attitudes affect teaching self-efficacy beliefs, the teaching profession, and primarily teachers'

teaching outcome-expectancy beliefs. In order to develop this understanding, it is essential to first comprehend what attitudes are and how they function in relation to individuals' behaviours.

Attitudes are hypothetical constructs which refer to "a mental and neural state of readiness, organized through experience, exerting directive or dynamic influence upon the individual's response to all objects and situations to which it is related" (Allport, 1935, p. 810). Attitudes are also accepted as latent constructs because of their non-observability; with this said, however, they determine the people's actions as being favourable or unfavourable (Ajzen, 2005; Milfont & Duckitt, 2010). Ajzen (2005) stated that attitudes are studied by categorising them into three sub-groups that are created in accordance with attitude-relevant responses. In this context, the researcher (2005) indicated that it is appropriate to study attitudes including "cognitive responses" (knowledge), "affective responses" (emotions), and "conative responses" (behaviours), all of which have been studied by many researchers in previous works (Allport, 1954; McGuire, 1969). Moreover, the researcher emphasised that attitudes can be inferred from verbal and non-verbal responses.

The first category, *cognitive responses*, involves perceptions and thoughts of people regarding objects, other people or events (Ajzen, 2005). They are "responses of a verbal nature and are expressions of *beliefs*" (Ajzen, 2005, p. 4). In order to clarify, the researcher exemplified the cognitive responses of doctors towards the medical profession. He simplified this, stating that those doctors who *believe* their workplaces are overcrowded and other professionals in the hospital are poorly qualified also have negative attitudes towards the medical profession. In contrast, it is expected that doctors who express *beliefs* about their hospitals having flexible working hours, appropriate working conditions and the best health professionals, will also have positive attitudes towards their medical profession. All in all, it is avowable to say that the attitudes of people are stimuli of their beliefs (Ajzen, 2005).

The second category, *affective responses*, is composed of emotions that give rise to an attitude towards an object (Ajzen, 2005; Upham et al., 2009). When people verbally express their admiration for an attitude object, those people will have positive attitudes; moreover, and similarly, when people feel bad about an attitude object, those people could harbour negative attitudes. In addition to this, when people respond to an attitude object nonverbally, e.g. facial expressions or physiological reactions that convey sickness or pain in body parts, this is a sign of negative attitudes towards that object.

The third category, *conative responses*, covers tendency, desire, plan, sincerity, actions or efforts shaped around the attitude object (Ajzen, 2005). In other words, people's attitudes towards certain objects, be them positive or negative, can be inferred from their behaviours, which emerge from the attitude object. For instance, people who want to protect nature donate money to a fund, and encourage other people to protect nature or read books about nature. Indeed, these types of people have positive attitudes towards nature. In contrast, people who feel it is unnecessary to donate money to plant trees or protect animals outside may possibly have negative attitudes towards nature, since they do not make an effort to achieve the attitude object.

Since attitudes are dynamic and not stable, they are open to change through interaction with others and new experiences; they are also respected as being frequently non-predictive of behaviour (Upham et al., 2009). However, Upham et al. (2009) also noticed that attitudes are generally helpful while trying to understand the reactions of different people to the same information, because attitudes also play a guider role in behaviours. According to Krosnick et al. (2005), attitudes can be studied through self-reports, which reflect the verbal and non-verbal overt responses of the participants. Because of this, most prefer to examine attitudes by using quantitative measurement tools (Ajzen, 2005), as is the case in the current study.

Related literature on Attitudes and Its Impacts

The literature review revealed numerous interesting findings in terms of understanding the impact of attitudes on teaching self-efficacy beliefs or teaching outcome-expectancy beliefs in pre-service teachers. With this said, however, there seemed to be limited evidence on how attitudes predict teaching outcome-expectancy beliefs in contrast with studies focused on teaching self-efficacy beliefs and attitudes. To begin with, studies explored pre-service teachers' attitudes and teaching self-efficacy beliefs, with most of them finding that the variables were correlated or influenced each other. One of the studies, which examined pre-service primary teachers' science teaching self-efficacy beliefs and attitudes towards science, revealed that there was a moderate positive relationship between these two factors, since the participants had positive attitudes towards science and a high level of self-efficacy beliefs to teach science (Bayraktar, 2011).

Another study, carried out with pre-service mathematics teachers, aimed to describe their attitudes towards geometry and teaching geometry self-efficacy beliefs; the authors also wished to establish if there was a correlation between them (Ünlü, Avcu & Avcu, 2010). The results indicated that pre-service mathematics teachers had positive attitudes towards geometry and a high level of self-efficacy beliefs to teach geometry. Similar to previous research results (Bayraktar, 2011), the authors reported a strong positive relationship between the geometry attitudes and self-efficacy beliefs regarding geometry teaching (Ünlü, Avcu & Avcu, 2010).

Besides this, another interesting study examined the attitudes of pre-service information and communication (ICT) teachers towards the teaching profession and ICT teaching self-efficacy beliefs; the results revealed that female pre-service ICT teachers had higher scores than male pre-service ICT teachers in terms of attitudes (Donmuş, Akpınar & Eroğlu, 2015). On the other hand, the self-efficacy beliefs of males for teaching ICT were higher than females' teaching ICT self-efficacy beliefs. Moreover, the study noted that attitudes towards the teaching profession explained 2% of ICT teaching self-efficacy beliefs harboured by pre-service ICT teachers.

In addition, a study conducted by Elaldı and Yeşilyurt (2016) with pre-service ECE teachers, intended to describe their self-efficacy beliefs and attitudes towards the teaching profession. The study also provided information about how grade levels influenced the attitudes and self-efficacy beliefs of pre-service ECE teachers. Lastly, the study revealed a relationship between self-efficacy beliefs and attitudes towards the teaching profession. The research findings showed that pre-service ECE teachers had high level self-efficacy beliefs and positive attitudes towards the teaching profession. Moreover, the pre-service ECE teachers had different self-efficacy beliefs and attitudes towards the teaching profession with respect to their grade levels. The researchers reported that senior and junior students had higher scores on self-efficacy beliefs and attitudes compared to freshman and sophomore students; however, a meaningful difference was only found between the freshman and junior students. Finally, the study revealed a small positive correlation between pre-service ECE teachers' attitudes and self-efficacy beliefs towards the teaching profession.

Another study, undertaken by Koştur (2012) with classroom and ECE teachers, sought to pinpoint the participants' science teaching self-efficacy beliefs and attitudes towards science. Furthermore, the research focused on the impact of the department on attitudes and teaching self-efficacy beliefs regarding science. Lastly, the research focused on the relationship between these variables. The results revealed that the participants had positive attitudes towards science and high self-efficacy beliefs regarding science teaching. Moreover, the researcher noted no difference between the participants' attitudes and self-efficacy beliefs with respect to department. Finally, Koştur (2012) concluded that there was a strong positive relationship between attitudes towards science and self-efficacy beliefs regarding science teaching.

Moreover, a study conducted by Olgan, Güner-Alpaslan and Öztekin (2014) with pre-service ECE teachers, aimed to describe the participants' science teaching self-efficacy beliefs, as well as the dimensions of these beliefs, including attitudes towards science teaching and scientific epistemological beliefs; the authors also

investigated the predictive influence of science teaching outcome-expectancy beliefs on pre-service ECE teachers' personal science teaching efficacy, scientific epistemological beliefs, and attitudes towards science teaching. The study results showed that, although science teaching attitudes were highly correlated with the science teaching outcome-expectancy beliefs of pre-service ECE teachers, they did not contribute to science teaching outcome-expectancy beliefs. In addition, the results indicated that outcome-expectancy beliefs were explained by personal science teaching efficacy and justification.

2.5.2 Knowledge

Another factor which was found to be associated with teacher self-efficacy is knowledge. Before reviewing how teaching knowledge affects the teaching self-efficacy, teaching efficacy or outcome-expectancy beliefs of teachers, it is necessary to understand what knowledge is, and how it functions in education settings.

According to Kerkhoff and Lebel (2006), "knowledge emerges as different sets of criteria for what may constitute justification" (p. 447). Indeed, these scholars defined teacher knowledge as a justifiable belief. For instance, the practical knowledge focuses on experience in practices, and content knowledge is based on the content changes in accordance with the topic.

Those teachers who feel more competent and confident in subject knowledge believe that they can teach better (Mansfield & Wood-McConney, 2012; Shallcross et al., 2002). According to Shulman (1986), the teachers do not have enough content knowledge to become efficient in teaching. Indeed, the examination of research concerning teacher knowledge and its impact on student learning outcomes revealed that teachers with better content knowledge (Hill, Rowan & Ball, 2005) and pedagogical knowledge (Baumert et al., 2010) increased the students' achievement in mathematics. Moreover, those teachers with higher pedagogical and psychological knowledge were found to have higher quality of instruction, student teacher relationships and higher cognitive activation (Kunter & Baumert, 2011).

Moreover, the research indicated that knowledge and instructional planning determine pre-service primary school mathematics teachers' teaching practices (Lui & Bonner, 2016); in addition, it was found that knowledge about effective teacher-child interactions and beliefs about children were correlated (Hu et al., 2017). Finally, research showed that teachers with better content and pedagogical knowledge had higher self-efficacy-beliefs to teach mathematics and practice it efficiently in the classroom (Cady et al., 2006). However, one study observed no significant difference between the constructivist self-efficacy beliefs and procedural knowledge regarding teaching mathematics (Lui & Bonner, 2016).

2.5.3 Personal or Perceived Self-Efficacy

Yet another factor which was found to have a relationship with teacher efficacy and teaching outcome-expectancy beliefs is personal teaching efficacy, also known as perceived teaching efficacy. Personal self-efficacy denotes "personal judgments of one's capabilities to organize and execute courses of action to attain designated goals" (Zimmerman, 2000, p. 83). Through personal self-efficacy, the individual motivates him/herself to accomplish the task; he/she also motivates him/herself to achieve the expected outcomes of his/her behaviour which are intentional (Bandura, 1997). In the same context, personal teaching efficacy relates to teachers' self-confidence and beliefs that they can finish the desired task successfully (Bleicher, 2004).

The self-confidence of educators in teaching depends on healthy personal teaching self-efficacy beliefs (Bleicher, 2004); indeed, this is because teachers with low personal teaching self-efficacy beliefs were found to have poor-quality teaching efficacy (Ramsey-Gassert & Shroyer, 1992). One particularly interesting study, which explored elementary school teachers' personal teaching self-efficacy beliefs and outcome-expectancy beliefs regarding science teaching, revealed that they had a positive moderate relationship (Desouza, Boone & Yılmaz, 2004). Indeed, this means that the elementary pre-service teachers who believed that effective science teaching is required so that children learn science effectively, also believed in their ability to help accomplish this task. In addition, the researchers found that, when

the educational level of the participants increased, their outcome-expectancy beliefs regarding science teaching and personal science teaching self-efficacy beliefs decreased; with this said, however, years of thought had a positive and high correlation with outcome-expectancy and personal self-efficacy beliefs for science teaching.

Similarly, another study (Olgan et al., 2014) carried out with pre-service ECE teachers, sought to describe their attitudes towards science teaching, scientific epistemological beliefs including justification and development, science teaching outcome-expectancy beliefs, and personal science teaching self-efficacy. In addition, the researchers examined the possible relationship between these variables. Their study results revealed that pre-service ECE teachers held outcome-expectancy and personal self-efficacy beliefs regarding science teaching which were slightly above the midpoint. Hence, it was concluded that the pre-service ECE teachers had a moderate level of outcome-expectancy beliefs and personal science teaching self-efficacy beliefs. In addition, the researchers stated that there were fairly sophisticated epistemological beliefs, with the highest mean score pertaining to the "justification" dimension rather than the "development" dimension. Moreover, with respect to their results, the researchers concluded that pre-service ECE teachers had a high level of attitudes towards science teaching. Following this, multiple regression results were presented, as the model significantly explained 32% of the variation in the pre-service ECE teachers' science teaching outcome-expectancy beliefs. Moreover, they reported that personal teaching efficacy beliefs and justification, which is the component of epistemological beliefs for science teaching, contributed in predicting pre-service ECE teachers' science teaching outcome-expectancy beliefs.

In the relevant literature, one particularly interesting study, conducted with elementary and secondary pre-service senior science teachers, sought to establish how perceived efficacy beliefs and classroom management beliefs, including attitudes, are correlated (Savran & Çakıroğlu, 2003). In the study, the Science Teaching Efficacy Belief Instrument (STEBI-B) was used to measure the self-

efficacy beliefs of participants, while the Attitudes and Beliefs on Classroom Control (ABCC) Inventory scale was used to describe their classroom management beliefs. The results indicated that both pre-service elementary and science teachers had positive teaching science self-efficacy beliefs. In addition, education level was found to have more of an impact on the personal and outcome-expectancy beliefs of the participants compared to gender. Moreover, the researchers stated that pre-service science teachers had stronger beliefs than pre-service elementary teachers; this was thought to be because of science teachers' teacher training programmes, including science courses. On the other hand, the researchers reported that there was no difference among pre-service science and elementary teachers in terms of gender and educational level.

Moreover, another interesting study (Ghaith & Shaaban, 1999) examined the roles of gender, grade level taught, and teaching experience in influencing the personal and general teaching efficacy of Lebanese teachers. The researchers used Gibson and Dembo's (1984) teaching efficacy scale, and found that neither personal nor general teaching efficacy were correlated. In addition, the personal and general teaching efficacy of participants did not differ in terms of gender, grade level taught and teaching experience.

2.6 Related studies focused on current research concepts

There exist many studies which have focused on SD and EfSD. Some studies have concentrated on pre-service and in-service teachers' environmental literacy (Cheng & So, 2015; Swanepoel, Loubser & Chacko, 2002; Teksöz, Şahin & Ertepınar, 2010); some have investigated in-service and pre-service teachers' environmental education knowledge (Caldehead, 1999; Kara, 1999); and others have sought to examine EfSD or SD knowledge levels (Stants, 2016; Kahriman-Öztürk & Olgan, 2016; Opstal & Huge, 2013; Winter & Firth, 2007). In addition to this, there are also investigations concerning pre-service and in-service teachers' environment (Pe'er, Goldman & Yavetz, 2007; Tuncer, Ertepınar, Tekkaya & Sungur, 2005), SD attitudes (Kahriman-Öztürk, 2016; Michalos, et al., 2010), and self-efficacy beliefs regarding SD and EfSD (Cebrian & Junyent, 2015; Demirci & Teksöz, 2017;

Effeney & Davis, 2013; Evans, Tomas & Woods, 2016; Malandrakis, Papadopoulou, Gavrilakis & Mogias, 2015; Stants, 2016; Sağdıç & Şahin, 2015; Yoo, 2016).

In this context, and by examining previous research findings, this section provides information related to international and national studies concerning the examination of pre-service and in-service teachers' SD attitudes, SD knowledge and self-efficacy beliefs in terms of SD/EfSD and EfSD teaching. Additionally, this part focuses on autobiographical factors, which were examined with a view to shedding light on their determinant effects on certain variables. Lastly, this section examines research on pre-service and in-service teachers' EfSD teaching self-efficacy beliefs and associated variables.

2.6.1 Research on Attitudes and Knowledge regarding Sustainable Development

In the international and national research arena, there are many studies which have focused, from different perspectives, on SD attitudes and SD knowledge in pre-service and in-service teachers. It seems that many research studies have been conducted using various instruments, both quantitative and qualitative, to measure teachers' attitudes towards, and knowledge of, SD.

One particularly interesting qualitative study conducted by Kopnia (2013) focused on eco-centric and anthropocentric attitudes towards SD. The researcher aimed to adapt the "Eco-centric and Anthropocentric Attitudes towards the Environment scale (EAATE)" developed by Thompson and Barton (1994); indeed, this was transformed into the "Eco-centric and Anthropocentric Attitudes towards the Sustainable Development Scale (EAATSD)" for higher education students. Before revising the EAATE scale, the author conducted interviews with university students for each item of the EAATE scale, and examined what the students recognised from the instrument items. Some items of the EAATE scale were found to be highly correlated, although they would measure anthropocentric and eco-centric values separately. With respect to the interview findings, the researcher excluded some

items which created confusion in students' minds while they were answering. After the interviews, the researcher designed 22 scale items which measured anthropocentric and egocentric values or attitudes concerning SD; in contrast, the original scale examined anthropocentric and egocentric attitudes towards *environment*. The researcher stated that the scale should be validated for future research studies, since her focus was solely on revising the EAATE scale.

A quantitative study conducted by Michalos, Creech, Donald and Kahlke (2010) sought to describe respondents' knowledge, attitudes and behaviours concerning EfSD/SD. The researchers studied two different datasets, which included adults as well as students from grades 6-12, in Manitoba, Canada. They constructed standardised tests for the adults and students, and conducted searches to establish how attitudes concerning EfSD/SD differed with respect to age, gender and levels of education. Additionally, they wanted to examine how knowledge level of SD and EfSD affected behaviours concerning EfSD/SD. The research findings revealed that gender was the most influential factor for the students, although favourable attitudes was the most influential factor for the adults in terms of their behaviours concerning EfSD/SD. In addition, it was found that attitudes were more influential than education level for the adults, although attitudes were equally influential in terms of knowledge for the students. The research results also showed that having favourable attitudes towards EfSD/SD was a more influential factor than age, education level and knowledge in terms of favourable behaviours concerning EfSD/SD; this was the case for both the adult and student samples. The researchers concluded that the research measurement tools were newly constructed, and thus the scores were found to be low in terms of participants stating the indicators of EfSD/SD behaviours strongly. As such, the scholars stated that more studies should be conducted in order to validate the tests' items and report the determinants of EfSD/SD behaviours. Moreover, they noted the need for further studies to generalize their research results to the different samples; indeed, this was because their findings were sample-specific.

Of particular note here is a mixed-methods study (Tomas, Girgenti & Jackson,

2015) which was conducted with first-year primary and ECE students enrolling in education faculties and studying the "education for sustainability" unit at their university. The study was performed in two phases. During the quantitative part of the study, in the pre-test and post-test, the participants completed a Likert-type survey measuring their attitudes towards, and perceptions of, sustainability. The aim of this was to measure the impact of the EfSD unit and its relevance to their EfSD learning. Following this, the participants' degree level was controlled in order to establish whether it had an influence on pre-service teachers' perceptions of EfSD. In the qualitative part of the study, three participants were interviewed to examine their understanding and experience of EfSD in detail. The study results revealed that the participants' attitudes towards EfSD and their perceptions of teaching EfSD improved. Moreover, first-year primary and ECE university students believed that the unit contributed to their SD knowledge, EfSD teaching confidence, and EfSD skills. Lastly, the participants reported that EfSD was a relevant issue in their degree, and something which must be taught in education faculties.

Along similar lines, a quantitative study (Pe'er et al., 2007) explored the environmental attitudes, knowledge and behaviours of pre-service teachers in Israel. Environmental attitudes and knowledge were gauged via a Likert-type scale and behaviours were measured by assessing the frequency of implementing environment-related issues in practice. The results showed that pre-service teachers had positive attitudes towards the environment, while environmental knowledge level was low. Moreover, the researchers reported that pre-service teachers had a moderate level of practice in environment-related issues. Lastly, the results indicated that knowledge, attitudes and behaviours were positively correlated; this conclusion was based on the fact that environmental attitudes and behaviours were highly correlated, although the relationship between attitudes and knowledge, and the relationship between behaviour and knowledge were lower.

2.6.2 Research on Role of Auto-Biographical Factors

Examination of the literature revealed that one of the core research areas was autobiographical factors involved in significant life experiences (Tanner, 1980); indeed, there are many factors which determine people's environmental attitudes or views (Chawla, 1999; Durkan et al., 2015; Kahriman, Öztürk & Olgan, 2016) and environmentally-responsible behaviours (Hsu, 2009).

Of note here is a study which intended to identify the significant life experiences of environmentalists, and which involved a survey in Norway and Kentucky (Chawla, 1999). The researcher conducted interviews with adults to obtain information about their childhood experiences, and whether these experiences inspired them to behave in an environmentally-friendly way. The researcher created 11 sources of commitment to the environment in accordance with participants' answers; these included religion, concern for children and grandchildren, education, family, organisations, natural areas, social justice, books, vocation and friends. She concluded that the main sources of people's environmental commitment were family members from childhood to adulthood, negative environmental experiences which occurred during childhood, and being a member of organisations focused on the environment and environmental education experience.

Another study, conducted in Taiwan by Hsu and using a mixed method (2009), investigated the significant life experiences of adults in two studies. The first study aimed to identify the roles of significant life experiences in the cultivation of environmental activists and environmental action, which were defined with respect to their responsible environmental behaviours. The second study sought to distinguish the environmentally-active and non-active people, who were defined via their environmental actions and were expected to be affected by their significant life experiences, which had been constructed during the period spanning childhood to adulthood. In order to achieve these goals, in the first study, 40 childhood memories presented by the participants were analysed using content analysis, and the results were used to formulate a questionnaire which included the 17 most frequently-mentioned categories; the purpose of this was to identify the factors

which contributed to participants' commitment to the environment. The first study's results revealed that the most important factors influencing whether adults were environmentalist people included: natural experiences during childhood, environmental organisations, loss of beloved places, and friends who encouraged them to join environmental organisations. While reporting their responsible environmental behaviours, most of the participants were found to be environmental political activists, since they participated in many meetings related to environmental policies, gathered signatures to prevent pollution violations, or dissuaded people from polluting the environment. After developing a questionnaire, the second study focused on environmentally-committed and environmentally-apathetic people, who were defined using answers developed in the first study. The second study also involved adults who had been randomly and purposively chosen according to their ages, residency in Hualien County, and agencies. In addition to 17 significant life experiences, the questionnaire included demographic variables such as gender, occupation, level of education and areas of childhood residency; moreover, and similar to the first study, the participants were again asked to state their environmental actions. According to the results of the second study, those adults found to have a score of 10 points or below were accepted as "people who are apathetic to environmental protection", while the others were deemed to be "environmental activists". After categorising the sample, the significant life experiences of participants were compared using the t-test. The t-test results revealed that 13 of the 17 significant life experiences had a substantial and significant effect on environmentally-apathetic and activist participants, and distinguished these participants. Moreover, the findings indicated that 54.6% of the variances in responsible environmental behaviours could be explained by significant life experiences. The most significant predictors were found to be friends, social justice, environmental organisations and loss of beloved natural places.

Moreover, a study carried out with five-year-old children in Turkey sought to compare their environmental attitudes, and establish whether these attitudes differed according to whether they received pre-school education in a village or a

city centre (Durkan et al., 2015). The researchers also explored the effect of gender on the environmental attitudes of both groups. Their results showed that the children living in the village and also receiving pre-school in the village had positive and favourable attitudes towards the environment, unlike the children living in the city centre. However, gender was not observed as a factor influencing the pre-school children's attitudes towards the environment.

Similar to the above-mentioned study, a study conducted by Tuncer, Sungur, Tekkaya and Ertepınar (2005) with grade 6 students in Turkey, focused on how the urban and rural areas, where the participants mostly lived throughout their lives, made a difference to their environmental attitudes. Their results revealed that there was a significant difference between the students who lived in urban areas compared with those from rural areas; indeed, more favourable environmental attitudes were expressed by the students living in rural areas.

In addition, one study, which was undertaken with pre-service ECE teachers, discussed the importance of EfSD and the inclusion of EfSD in teacher education programmes (Kahriman, Öztürk & Olgan, 2016). The researchers also examined the influence of autobiographical factors on pre-service ECE teachers' views regarding the importance of EfSD. As such, they examined the effect of childhood location and household type during childhood, and treated these as demographic variables. In light of their study results, it was found that the pre-service ECE teachers felt that the purpose of EfSD was "raising awareness about SD and EfSD", and "acquiring creative and holistic thinking skills in problem solving and decision-making stages". The pre-service ECE teachers also thought EfSD to be embedded in teacher education programmes. And lastly, with respect to the t-test results, it was found that childhood location and household type during childhood made a significant difference in terms of pre-school teachers' views on the purpose of EfSD; indeed, this was because the pre-school teachers who lived in rural areas were found to have higher scores than the participants who lived in urban areas during childhood in terms of their views on the importance of EfSD. Moreover, with respect to their views regarding the importance of EfSD, pre-service ECE

teachers who lived in a house during childhood were found to have higher scores than those who lived in an apartment.

2.6.3 Research on Pre-service and In-service Teachers' EfSD Teaching Self-Efficacy Beliefs and Associated variables

Of particular note, here is a study which sought to construct a valid and reliable measure to examine elementary teachers' beliefs on EfSD (Sağdıç & Şahin, 2015); the sample comprised pre-service and in-service elementary teachers in Ankara. The research proceeded in two phases. The first phase was carried out with pre-service elementary teachers as a pilot study. The scale items were examined in terms of their reliability, and were analysed using exploratory factor analysis. In light of the results of their first study, the researchers ensured the reliability of the scale and constructed another scale comprising three factors, namely "beliefs about implementation of EfSD", "beliefs about limitations of EfSD", and "beliefs about adequacy of EfSD". Following this, the scale was completed by elementary school teachers working in eco-schools and green package teacher programmes. The second phase, which sought to identify the reliability, convergent validity, discriminant validity and construct validity of the scale, was inspired by the first phase of study. According to their findings, the researchers reported that the scale with 32 items was appropriate for use in studies aiming to describe elementary teachers' beliefs towards EfSD.

Similarly, another study (Malandrakis et al., 2015) conducted in Greece aimed to construct an instrument capable of measuring pre-service teachers' EfSD beliefs and EfSD knowledge. General teaching efficacy was also examined using Woolfolk and Hoy's scale (2001); moreover, the EfSD knowledge, general teaching efficacy and EfSD beliefs of pre-service teachers were addressed, in terms of whether there was any relationship between them. To achieve these goals, the researchers first developed a 7-point Likert-type scale under the heading "Teachers Self-Efficacy Scale for ESD" (TSESESD); this involved 24 items and a knowledge scale comprising 31 items. Following this, they pilot tested the scales with pre-service primary education teachers. With respect to reliability analysis, the scales were

found to be reliable; moreover, the researchers stated that their TSESESD scale was constructed around four factors, namely "values and ethics", "systems thinking", "emotions and feelings" and "action". In addition, the knowledge scale comprised the dimensions of "EfSD content knowledge" and "EfSD pedagogical content knowledge". After reporting that their instruments were valid and reliable, the researchers provided their correlation analysis results, which focused on general teaching efficacy, knowledge (along with its dimensions), and TSESESD, along with its subdomains. According to their results, pre-service teachers' scores on the TSESESD scale with subdomains had a medium to large correlation with the general teaching efficacy scale. Moreover, there were high correlation values between TSESESD and the knowledge scale with its domains.

Additionally, a study conducted by Demirci and Teksöz (2017) intended to investigate the ways in which university students integrated sustainability issues into their daily and professional lives, as well as their self-efficacy beliefs regarding integrating sustainability principles into their daily and professional lives. For this purpose, the researchers adapted the self-efficacy beliefs scale, originally developed by Enochs and Riggs (1990) and translated by Tekkaya, Çakıroğlu and Özkan (2004) into Turkish. Following this, they provided an elective course focusing on EfSD. At the end of the course, the university students were asked to complete the self-efficacy beliefs scale and write an essay on the topic of their definition of sustainability; the purpose of this was to understand their opinions on integrating sustainability issues into daily and professional lives. The study results showed that, although the university students had a high level of self-efficacy beliefs with regards integrating sustainability issues into daily and professional lives, they could not explain the ways in which sustainability issues were integrated into daily and professional lives.

A quantitative research study carried out in Australia by Effeney and Davis (2013) sought to examine pre-service primary and early years education teachers' sustainability knowledge and self-efficacy to teach sustainability; this was achieved by using a questionnaire developed by Boon (2011). Moreover, the scholars

formulated a group of questions which explored pre-service teachers' attitudes towards three items; indeed, the items were explored under the heading "importance of sustainability". The research results indicated that most of the pre-service teachers had positive attitudes towards SD, as they agreed with the attitude items; indeed, these items measured the participants' perceptions of the importance of SD in terms of knowing what sustainability is and how they can explain it with general concepts. The findings also showed that there was a significant positive relationship between teachers' efficacy to teach students about sustainability, and perceived sustainability knowledge. In other words, if the perceived knowledge level is high, the self-efficacy for teaching sustainability increases. Furthermore, the researchers declared that these findings may be attributed to the participants' teacher education programmes, which focused on a unit based on environmental sustainability during the first semester of their education. With this said, however, it is impossible to determine whether or not that unit certainly affected the results. The researchers also explained that there was no relationship between perceived and measured knowledge, nor was there a relationship between measured knowledge and teacher efficacy. Thus, Effeney and Davis (2013) stressed the need for further studies which could potentially explore the flaws of the instrument and control the items to establish whether they truly can measure the understanding of sustainability. Moreover, the authors claimed that the participants in the study may not have been aware of their real knowledge and ability, and may have had an "inflated perception" of their teaching sustainability abilities. Indeed, this gives rise to another research question, namely whether such a finding is due to the lack of mastery of sustainability teaching experience in the field of education.

A mixed-methods study carried out with pre-service chemistry teachers (Stants, 2016) aimed to explore their EfSD teaching self-efficacy beliefs and EfSD knowledge. With this purpose in mind, the quantitative part of the study comprised two phases; in the first phase, the researcher adapted the STEBI-B instrument (Bleicher, 2004), which measures the teaching self-efficacy beliefs of science teachers. This was transformed into a scale focusing on EfSD teaching beliefs in two dimensions, namely personal EfSD teaching efficacy and EfSD teaching

outcome-expectancy. The researcher also developed an instrument to explore the EfSD knowledge of pre-service chemistry teachers using components of SD via multiple choice questions. Following this, the researcher pilot tested the instruments. Given the reliability results of the subscales, the EfSD teaching outcome-expectancy beliefs subscale was omitted from the main study, and the study proceeded with the personal EfSD teaching efficacy subscale. In the second phase, the researcher explored the participants' scores on personal EfSD teaching efficacy and knowledge of EfSD, as well as the possible association between them. With respect to her findings, pre-service chemistry teachers exhibited a low level of EfSD knowledge. However, the fact that they indicated moderate beliefs showed that they believed in themselves and their ability to be successful in EfSD teaching. In addition, the researcher reported that the personal EfSD teaching efficacy of pre-service chemistry teachers was not related to their knowledge of EfSD. In the qualitative part of the study, the researcher asked open-ended questions about EfSD personal teaching efficacy and EfSD knowledge; focus group interviews were also conducted with the same sample. Following her qualitative study analyses, Stants (2016) concluded that the participants had limited SD knowledge and moderate self-efficacy regarding teaching EfSD in educational settings. On the other hand, the participants had some knowledge of SD and believed in their ability to teach that limited knowledge to the children with appropriate teaching strategies.

CHAPTER 3

METHODOLOGY

This chapter presents information regarding the present study, including the design of the study, the purpose of the study, the population and sample, the measures of the study and pilot study, the data collection procedure of the main study, and the data analysis process.

3.1 The design of the study

The current study is descriptive in nature. Descriptive studies are carried out to gather the opinions, beliefs, and attitudes of a large group of people about a certain issue (the research focus) (Lodico, Spaulding & Voegtle, 2006). These studies explain the phenomenon being addressed (Knupfer & McLellan, 2001). According to Fraenkel and Wallen (2006), in descriptive studies there is no manipulation of or interference with the variables being studied in the research; they are simply measured and analysed without changing their current situations.

To be able to achieve the study aims, cross-sectional survey research methodologies were used. Cross-sectional surveys are conducted in order to obtain an idea about the characteristics of the population at a certain time and place (Fraenkel & Wallen, 2006).

3.2 Purpose of the Study

The current study aimed to reveal pre-service ECE teachers' attitudes towards SD, SD knowledge, and EfSD teaching self-efficacy beliefs, the latter of which comprise outcome-expectancy self-efficacy beliefs and personal teaching self-efficacy beliefs. Moreover, self-reported auto-biographical factors were examined in terms of whether they had any effect on the SD attitudes, EfSD teaching self-

efficacy beliefs and SD knowledge of pre-service ECE teachers. Lastly, EfSD teaching personal self-efficacy, SD attitudes and SD knowledge were investigated in terms of whether they predicted pre-service ECE teachers' outcome-expectancy beliefs regarding EfSD teaching. In order to achieve the research aims, the following questions were examined:

1. What are the general patterns of pre-service ECE teachers' EfSD teaching self-efficacy beliefs, SD attitudes, and SD knowledge?
2. Do pre-service ECE teachers' SD attitudes, EfSD teaching self-efficacy beliefs and SD knowledge levels differ with respect to auto-biographical factors (grade levels, membership to a student club at university, childhood residence, and household type during childhood)?
3. How well do pre-service ECE teachers' personal EfSD teaching self-efficacy beliefs, SD attitudes, and SD knowledge predict their outcome-expectancy self-efficacy beliefs regarding EfSD teaching?

3.3 Population and Sample

The target population of the study included all pre-service ECE teachers studying in the education faculties of universities in Turkey. However, given that it was not feasible to reach all pre-service ECE teachers in Turkey, it was fitting to employ an accessible population. While deciding an accessible population, it was plausible to report that not all pre-service ECE teachers in Turkey experience courses or units focusing on sustainable development (SD), environmental education (EE) and education for sustainable development (EfSD) issues during their teacher education programs; because, these issues are not mostly examined in course catalogues of education faculties in Turkey. Therefore, in order to make such an inference the pre-service ECE teachers were asked if they have taken any course related to SD, EfSD and EE during their teacher education.

In the current research, the convenience sampling method was preferred. The convenience sampling method is an appropriate sampling method with which to collect data from participants who are near to the researcher and who are easily

accessible (Fraenkel & Wallen, 2006). The data was collected from 541 pre-service ECE teachers in Ankara. The research sample contained first-, second-, third- and fourth-year pre-service early childhood teachers who were pursuing their education in faculties across Ankara.

3.3.1 Demographic Information on Pre-service ECE Teachers

The current study was conducted with a total of 541 pre-service ECE teachers who were studying at public universities located in Ankara. 32 (5.9%) of the participants were male, while 509 (94.1%) were female; the ages ranged from 18 to 35. In addition to this, 130 (24%) of the respondents were freshman students, 133 (24.6%) were sophomore students, 154 (28.5%) were junior students, and 123 (22.7%) were senior students. Demographic information of students from each university are revealed in Table 3.1.

Table 3.1.
Demographic Information of the Participants

Gender	***F***	***%***
Female	509	94.1
Male	32	5.9
Year	***F***	***%***
Freshman	130	24.0
Sophomore	133	24.6
Junior	154	28.5
Senior	123	22.7

3.4 The Pilot Study

3.4.1 Data Collection Procedure for the Pilot Study

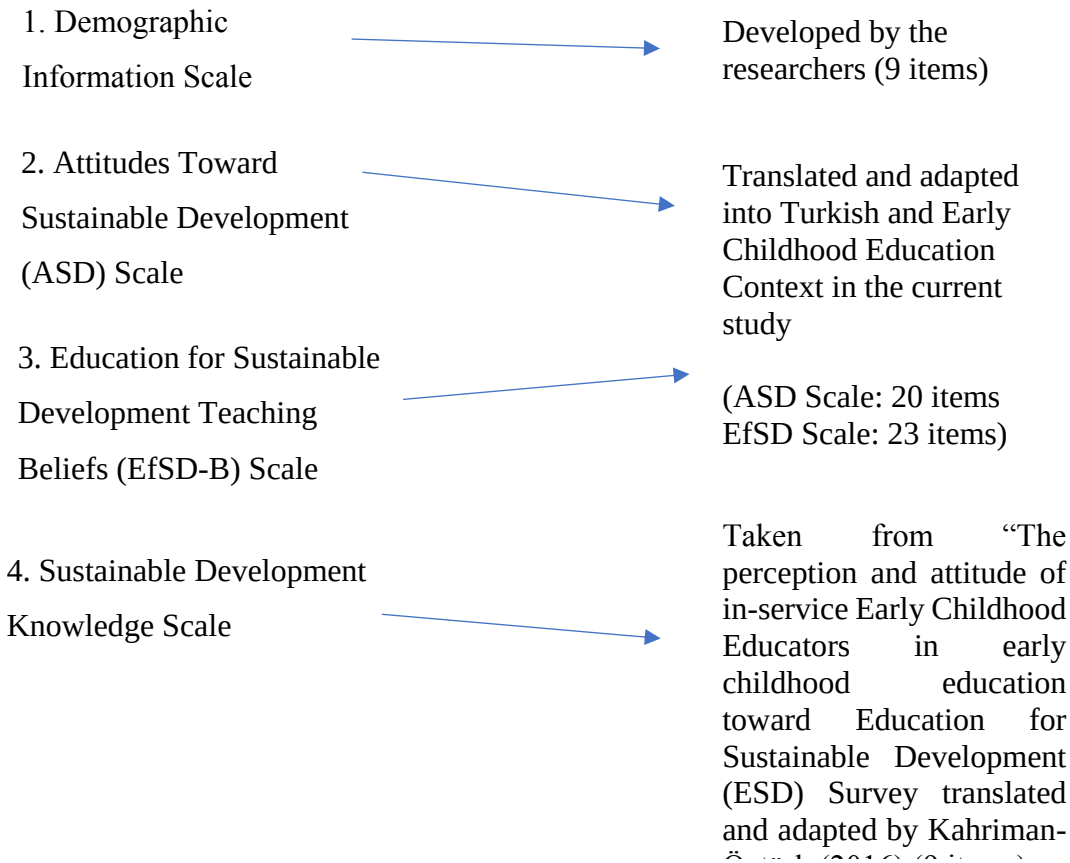
Before piloting the scales and implementing the study, it was necessary to obtain research ethics committee approval from Middle East Technical University (METU), as well as the required permission from each public university. Following this, the pre-service ECE teachers were selected via the convenience sampling

method. The data was collected in the fall semester of the 2016-2017 academic year from 158 pre-service ECE teachers; the purpose of this was to validate the SD knowledge scale, the ASD scale and the EfSD-B scale. The questionnaires were completed in a single session, with each questionnaire requiring approximately 15 minutes of the respondent's time. In addition to this, before the pre-service teachers were asked to complete the questionnaires, a letter intended to inform them of the research purpose was prepared; this letter sought to obtain permission and ask for their participation in the research.

3.5 Measures of the Study

In the study, four scales were used. The data was collected from the pre-service ECE teachers using two adapted scales, namely the "Attitudes towards Sustainable Development Scale (ASD)" and the "Education for Sustainable Development Teaching Beliefs Scale (EfSD-B)". The research also used an adapted version of the "Sustainable Development Knowledge Scale (SD-K)", which was translated into Turkish by Kahriman-Öztürk (2016). Lastly, researcher oriented "Demographic Information Scale" was used. Figure 3.1 summarises the data collection instruments.

Figure 3.1. *Data Collection Instruments*



3.5.1 *Demographic Information Form*

The demographic information form was used to obtain information about the pre-service ECE teachers' gender, age and grade levels. The scale also consisted of questions concerning membership to a student club at university, childhood residence and household type during childhood, taking elective courses based on SD and EfSD, and number of courses. Appendix A includes the demographic information form questions.

3.5.2 *Attitudes towards the Sustainable Development Scale (ASD)*

This study aimed to describe pre-service ECE teachers' attitudes towards SD and its role in predicting EfSD teaching outcome-expectancy beliefs. For this purpose, the ASD scale, originally developed by Biasutti and Frate (2016), was translated

into Turkish; the aim of this was to measure the attitudes of university students towards sustainable development. The questionnaire used a 5-point Likert-type scale, with 20 items which were constructed around 4 dimensions, namely "environment", "economy", "society" and "education". Each dimension in the ASD scale comprised five items.

Before starting to adapt the scale, the necessary permission was obtained from the original author via e-mail. While translating and adapting the "Attitudes towards Sustainable Development Scale", the original of which is in the English language, the International Test Commission (ITC) Guidelines for Translating and Adapting Tests (2005) were respected. Following the translation of the scale, two experts specialising in early childhood education and education for sustainable development reviewed the scale items in terms of their content validity, structure of sentences and intelligibility for the pre-service teachers. In accordance with the experts' recommendations, the scale's items were reviewed and revised to make the items culturally and linguistically appropriate in the Turkish context.

After the translation and adaptation process of the ASD scale, it was pilot tested with 158 pre-service ECE teachers from a state university located in central Turkey. The data gathered from the participants was entered into SPSS 22.0 (Statistical Package for the Social Sciences) and analysed; a major concern of the pilot study was to analyse the feasibility and usability of the ASD tool in gathering data from pre-service ECE teachers. Moreover, the pilot study aimed to examine the translations' clarity and appropriateness for pre-service ECE teachers. In that way, the items in the scale could be redesigned, changed or translated again to make them clearer for future studies. Appendix B includes the final version of the ASD Scale items.

3.5.2.1 Pilot Study Results of the Attitudes towards Sustainable Development Scale

The pilot study analysis results for the ASD scale can be broken down into three parts. First of all, before starting EFA, the Cronbach's alpha value of the scale was

controlled. Following this, EFA was conducted. The scale was then controlled again for its internal consistency with the remaining items.

3.5.2.1.1 Reliability Results

During the first phase, the Cronbach's alpha value was examined. In previous research conducted by Biasutti and Frate (2016), the total score for the Cronbach's alpha value was found to be .85, while the Cronbach's alpha value for factors ranged between .660 and .757. In the pilot study, the total Cronbach's alpha value was found to be .86, while values ranged between .576 and .861 (*environment* = .576, *economy* = .595, *social* =.854 and *education* =.861). It was inferred that the value of .86 suggested that the scale had a good internal consistency reliability, since values higher than .7 are acceptable and those above .8 are recommended (Pallant, 2007).

3.5.2.1.2 *Exploratory Factor Analysis Results*

First, item-scale correlation values were taken into consideration. The item-scale correlation values for most of the items were high. The corrected item-total correlation results revealed that the item-scale correlation value of the first item (Item 1: When people interfere with the environment, they often produce disastrous consequences) was .177. Moreover, the item-scale correlation value of the fourth item (Item 4: Building development is less important than environmental protection) was found to be .149. Lastly, the ninth item (Item 9: Government economic policies should act if a country is wasting its natural resources) was found to have a value of .099. Although these values were below .3, the decision was taken to keep them for the exploratory factor analysis, so as to make clean inferences. The corrected item-total statistics scores for the ASD scale are presented in Table 3.2.

Table 3.2

Item Total Statistics for Turkish Version of Attitudes toward Sustainable Development Scale items

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	78,3433	96,678	,177	,868
Item 2	77,7388	93,428	,388	,859
Item 3	78,2537	93,679	,333	,862
Item 4	78,7687	95,833	,149	,873
Item 5	78,0299	94,195	,307	,863
Item 6	78,0075	90,970	,516	,854
Item 7	77,8657	93,125	,457	,857
Item 8	77,8806	93,444	,384	,859
Item 9	79,3433	97,144	,099	,875
Item 10	77,5373	90,656	,610	,852
Item 11	77,3134	89,675	,713	,849
Item 12	77,5597	90,865	,599	,852
Item 13	77,9104	90,639	,586	,852
Item 14	77,5970	89,370	,655	,850
Item 15	77,4627	91,303	,666	,851
Item 16	77,5746	88,893	,602	,851
Item 17	77,4179	90,110	,715	,849
Item 18	77,7388	90,811	,610	,852
Item 19	77,6493	92,079	,505	,855
Item 20	77,5821	89,027	,595	,851

Communalities which revealed the variances between the scale items indicated that all values were above .3, thus meaning that all items fit well each other (Pallant, 2007) (see Table 3.3).

Table 3.3

Communalities for the Turkish Version of Attitudes toward Sustainable Development Scale items

	Initial	Extraction
Item 1	1.000	,423
Item 2	1.000	,499
Item 3	1.000	,407
Item 4	1.000	,571
Item 5	1.000	,569
Item 6	1.000	,491
Item 7	1.000	,403
Item 8	1.000	,467
Item 9	1.000	,548
Item 10	1.000	,482
Item 11	1.000	,673
Item 12	1.000	,650
Item 13	1.000	,473
Item 14	1.000	,552
Item 15	1.000	,614
Item 16	1.000	,615
Item 17	1.000	,750
Item 18	1.000	,581
Item 19	1.000	,517
Item 20	1.000	,676

Extraction Method: Principal Component Analysis

In the second part of the pilot study analysis, the EFA results were checked for the sampling adequacy by Kaiser-Meyer-Olkin test (KMO) value; this was found to be .872, and was accepted as adequate (George & Mallery, 2003). Moreover, the Bartlett's test of sphericity was controlled for the multivariate normality of the distribution and correlation matrix. The value was found to be below .05, which means that the multivariate normality distribution assumption was not violated (Tabachnick & Fidell, 2013) and additional factor analysis could be conducted. Table 3.4 reveals the results concerning the KMO and Bartlett's test of sphericity.

Table 3.4

The Results of the KMO and Bartlett's Test for the Turkish Version of Attitudes toward Sustainable Development Items

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.872
Bartlett's Test of Sphericity	Approx. Chi-Square	1131.561
	Df	190
	Sig.	.000

After checking the item-total statistics, the communalities, and the KMO and Bartlett's test of sphericity values, the principle component analysis was conducted. The analysis results, based on eigenvalues of the factors, showed that the four-factor solution explained 54.81% of variance, the three-factor solution explained 49.11%, the two-factor solution explained 42.79%, and the one-factor solution explained 33.85% of variance (see Table 3.5).

However, in order to decide on the factor numbers for the main study, the scree plot was also checked and examined; said examination revealed that the scree plot curve reached a stable level after the first factor. Therefore, the ASD Scale was retained as the one-factor solution, since it was accepted as the best solution while deciding the factor numbers (Costello & Osbrone, 2005). Figure 3.2 reveals the scree plot obtained from the first EFA results.

Table 3.5

Total variance for the Turkish Version of Attitudes toward Sustainable Development Items

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cum. %
Item 1	6,772	33,858	33,858	6,772	33,858	33,858
Item 2	1,787	8,933	42,790	1,787	8,933	42,790
Item 3	1,264	6,321	49,111	1,264	6,321	49,111
Item 4	1,140	5,701	54,812	1,140	5,701	54,812
Item 5	,988	4,938	59,749			
Item 6	,981	4,904	64,654			
Item 7	,865	4,323	68,977			
Item 8	,794	3,972	72,949			
Item 9	,764	3,820	76,769			
Item 10	,717	3,583	80,351			
Item 11	,608	3,042	83,394			
Item 12	,587	2,937	86,331			
Item 13	,503	2,515	88,847			
Item 14	,419	2,094	90,941			
Item 15	,412	2,061	93,002			
Item 16	,404	2,022	95,024			
Item 17	,313	1,563	96,587			
Item 18	,277	1,386	97,973			
Item 19	,214	1,069	99,042			
Item 20	,192	,958	100,000			

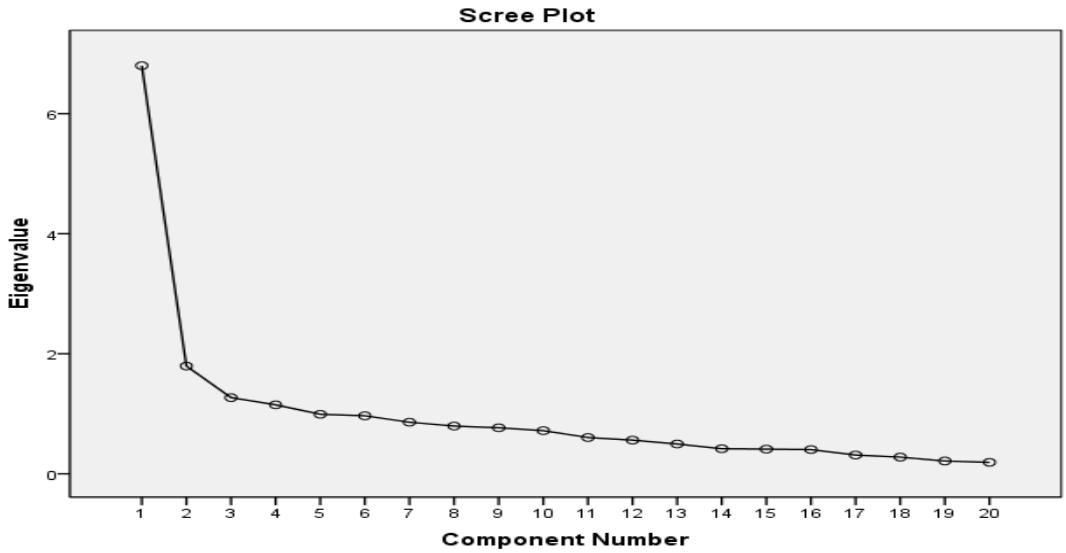


Figure 3.2 *The first scree plot for Turkish Version of ASD Scale*

According to the Component Matrix table, it was inferred that the items were spread across four components; however, they were mostly loaded on the first component (see Table 3.6).

Table 3.6.

The Component Matrix for the Turkish Version of Attitudes toward Sustainable Development Scale

	Component			
	1	2	3	4
Item 17	,820			
Item 11	,793			
Item 15	,767			
Item 12	,719			
Item 14	,719			
Item 16	,716	-,308		
Item 20	,703			,304
Item 18	,691			
Item 10	,668			
Item 13	,661			
Item 19	,585			,364
Item 6	,532	,378		
Item 8	,464	,315		-,357
Item 2	,440			-,439
Item 1		,585		
Item 3	,356	,506		
Item 7	,422	,471		
Item 9			,712	
Item 5		,350	,594	
Item 4		,354		,637

Because the results supported the one-factor construct of the ASD scale, EFA was conducted again by forcing the items to the one-factor solution if they could still be constructed around one factor. In beginning with the second exploratory factor analyses, it was first decided to use one of the most frequently-chosen oblique rotation methods, namely Direct Oblimin (Pett, Lackey & Sullivan, 2003). As stated by Pedhazur and Schmelkin (1991), Direct Oblimin rotation may be the best choice for studies which employ correlated sub-scales. Given that in the current study, each sub-scale was found to be correlated and present in the one-factor

solution, it was deemed appropriate to maintain the analysis with Direct Oblimin rotation.

Following the analyses with Direct Oblimin rotation and one-factor solution, the eigenvalues were first checked to describe what percentage of the variance was explained. It was found that, for the one-factor solution, only 33.858% of the variance was explained (see Table 3.7), compared with over 55% explained by the four-factor solution.

Table 3.7

Total variance for the Turkish Version of Attitudes toward Sustainable Development Items

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cum. %
Item 1	6.772	33,858	33,858	6,772	33.858	33,85
Item 2	1,787	8,933	42,790			
Item 3	1,264	6,321	49,111			
Item 4	1,140	5,701	54,812			
Item 5	,988	4,938	59,749			
Item 6	,981	4,904	64,654			
Item 7	,865	4,323	68,977			
Item 8	,794	3,972	72,949			
Item 9	,764	3,820	76,769			
Item 10	,717	3,583	80,351			
Item 11	,608	3,042	83,394			
Item 12	,587	2,937	86,331			
Item 13	,503	2,515	88,847			
Item 14	,419	2,094	90,941			
Item 15	,412	2,061	93,002			
Item 16	,404	2,022	95,024			
Item 17	,313	1,563	96,587			
Item 18	,277	1,386	97,973			
Item 19	,214	1,069	99,042			
Item 20	,192	,958	100,000			

Secondly, the Component Matrix table was assessed to examine the factor loadings on the one-factor solution. According to the Component Matrix table, four items (items 1, 4, 5 and 9) were found to be unloaded on the one-factor solution.

Therefore, they were extracted from the scale respectively until the scale returned to a one-factor scale with strongly loaded items. After extracting the four items from the scale, EFA was conducted again with Direct Oblimin rotation to examine its fitness for the one-factor solution.

While assessing the items, first the eigenvalues were again controlled in order to establish how much variance explained the one-factor solution. The results revealed that the one-factor solution explained 41.611% of variance (see Table 3.8).

Table 3.8

Total variance for the Finalized Turkish Version of Attitudes toward Sustainable Development Items

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cum. %
Item 1	6,658	41,611	41,611	6,658	41,611	41,611
Item 2	1,499	9,370	50,981			
Item 3	1,074	6,711	57,692			
Item 4	,881	5,508	63,200			
Item 5	,816	5,102	68,302			
Item 6	,780	4,876	73,178			
Item 7	,769	4,807	77,984			
Item 8	,600	3,748	81,733			
Item 9	,561	3,505	85,238			
Item 10	,486	3,037	88,274			
Item 11	,421	2,632	90,906			
Item 12	,412	2,576	93,482			
Item 13	,328	2,050	95,532			
Item 14	,297	1,859	97,391			
Item 15	,222	1,384	98,775			
Item 16	,196	1,225	100,000			

Moreover, the final scree plot was assessed and examined, revealing that the curve began to level off after the second factor. This means that the scale has one dimension which encompasses the four subscales of *environment*, *economy*, *society* and *education*. Surprisingly, the new dimension, *education*, contributed to SD, and was also found to be interrelated with its other dimensions. As emphasised earlier, sustainable development issues focus on social, economic, environmental and

educational aspects in a holistic approach (Biasutti & Frate, 2016; UNESCO, 2005, 2008); moreover, examining the dimensions of SD may cause confusion among people (Summers & Childs, 2007; Warburton, 2003). The dimensions of SD are dynamic and interrelated with all of its components (Warburton, 2003). Therefore, the one-factor solution was preferred for this scale, due to the integrated structure of SD. Figure 3.3 reveals the scree plot of the finalised version of the ASD scale obtained from the second EFA results.

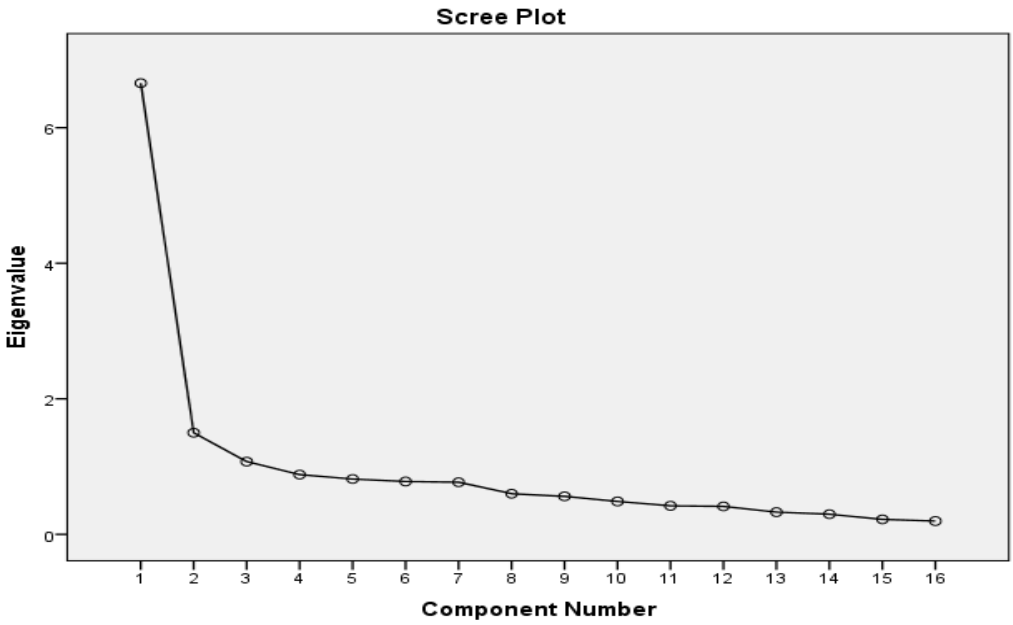


Figure 3.3 *The Final scree plot for Turkish Version of Finalized ASD Scale*

After finalising the scale items which were found to be appropriate for the Turkish context, the items were checked again in terms of internal consistency. The Cronbach's alpha value for the 16 items was found to be .90, which means that the items had a strong relationship and the scale had a perfect reliability (Pallant, 2007).

3.5.3 *Education for Sustainable Development Teaching Beliefs Scale (EfSD-B)*

The current study also aimed to describe pre-service ECE teachers' self-efficacy beliefs regarding EfSD teaching. To achieve this, the "Education for Sustainable Development Teaching Beliefs Scale (EfSD-B)", originally constructed by Stants (2016) for pre-service teachers, was translated into Turkish for pre-service ECE

teachers. Before adapting and modifying the scale, essential permission was obtained from the researchers who developed the scale. Following this, the scale was translated into the Turkish context and adapted for ECE teachers by changing necessary words in the items.

While developing the scale, Stants (2016) basically changed and adapted Bleicher's (2004) (Preservice) Science Teaching Efficacy Belief Instrument (STEBI), which aimed to measure pre-service and in-service teachers' self-beliefs related to teaching science. The STEBI instrument from Bleicher (2004) was re-designed to examine teaching self-efficacy beliefs with regards EfSD.

The 5-point Likert-type scale involved selecting responses ranging from "*strongly agree*" to "*strongly disagree*". Items 3, 6, 8, 13, 17, 19, 20, 21 and 23 were reversely coded. Given that Bleicher (2004) split the STEBI scale into two dimensions, Stants (2016) also studied the EfSD-B scale in two self-efficacy constructs, namely "The personal teaching efficacy scale (PTE)" and "The teacher outcome (expectancy) scale (TOE)". The PTE scale included 13 items (2, 3, 5, 6, 8, 12, 17, 18, 19, 20, 21, 22, 23), while the TOE scale comprised 10 items (1, 4, 7, 9, 10, 11, 13, 14, 15, 16). Those participants with higher scores on the EfSD-B Scale were accepted as having higher levels of self-efficacy to teach EfSD. The current study also examined the sub-scales of the EfSD-B scale, namely the "Personal teaching efficacy scale (PTE)" and "The teacher outcome (expectancy) scale (TOE)".

The scale constructed by Stants (2016) was based on the self-efficacy beliefs of middle-level pre-service teachers for teaching EfSD; in light of this, in the current study, the researchers changed each item of the EfSD-B scale to make them appropriate for pre-service ECE teachers. In that way, it became possible to use the scale to measure the ECE teachers' self-efficacy beliefs with regards education for sustainable development and the ECE system in the Turkey context.

While adapting the EfSD-B scale items; the word "*student/s"* was changed to "*pre-school children*". Moreover, extra wording changes were implemented where necessary. For example:

Original Item 4. When the sustainable development scores of students improve, it is often due to their teacher having found a more effective teaching approach.

Adapted version of Item 4. When young children learn better the topics related to sustainable development, it is often due to their teacher having used a more effective teaching approach.

After completing the necessary changes to the items of the EfSD-B scale, it was pilot tested with 158 pre-service ECE teachers who were attending the education faculty of Aksaray University. The data was entered into SPSS 22.0 (Statistical Package for the Social Sciences) and analysed. The aim was to analyse the feasibility and usability of the EfSD-B instrument for pre-service ECE teachers. Appendix C includes the final version of the EfSD-B scale items.

3.5.3.1 Pilot Study Results of Turkish version of the EfSD-B Scale

The pilot study analysis results for the EfSD-B scale were also broken down into four parts. First of all, since it has been suggested that the reliability of the scale ought to be assessed before starting EFA, the Cronbach's alpha value of the scale was controlled. Secondly, EFA was conducted to control the items in terms of whether they fit to the scale. Thirdly, the scale was controlled again so as to ensure internal consistency with the remaining items.

3.5.3.1.1 Reliability Results

Since Stants (2016) first presented the reliability analysis results of the scale, similarly, the Cronbach's alpha value of the EfSD-B scale was examined in the current research. Similar to Bleicher (2004) and Stants (2016), the scale's internal consistency was assessed by analysing each sub-scale's Cronbach's alpha values. In addition to controlling the sub-scales of the EfSD-B scale, the total Cronbach's alpha value of the EfSD-B scale was also examined.

In the current study, the Cronbach's alpha value of .73 with 23 items suggested that the scale had a good internal consistency reliability. When the scale was analysed in terms of its sub-scales, the Cronbach's alpha value for PTE with 13 items was

found to be .76, which was favourable; moreover, the Cronbach's alpha for the TOE with 10 items was .64, although in previous research the value was low (α=.47).

Owing to low internal consistency of the TOE scale, the previous study by Stants (2016) did not continue with two sub-scales of EfSD-B. The researcher omitted the TOE sub-scale from the ESDK&B and did not use it while collecting data for the main study. In contrast with Stants' study (2016), each sub-scale supported the scale's internal consistency reliability in the current research.

3.5.3.1.2 *Exploratory Factor Analysis Results*

After assessing the internal consistency of the EfSD-B scale, in the second part, the item-scale correlation values were analysed. The item-scale correlation values of the items from the EfSD-B scale were extremely high; however, there were items whose values were lower than .30 (see Table 3.9). In order to make clean inferences for all items, 23 items were kept for further analyses.

Table 3.9

Item Total Statistics for Turkish Version of Education for Sustainable Development Teaching Beliefs Scale items

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	73,0000	62,104	,234*	,730
Item 2	72,8593	59,868	,530	,715
Item 3	73,0963	59,132	,367	,720
Item 4	72,6000	60,645	,413	,720
Item 5	74,2000	62,296	,136*	,740
Item 6	73,2222	57,308	,445	,713
Item 7	72,9111	60,679	,327	,724
Item 8	73,2741	59,200	,347	,722
Item 9	72,6741	60,386	,360	,722
Item 10	73,6889	68,649	-,234*	,766
Item 11	72,9407	61,653	,233*	,731
Item 12	73,8667	63,848	,073*	,742
Item 13	73,6074	65,240	-,025*	,750
Item 14	73,2296	62,939	,146*	,737
Item 15	72,8519	61,232	,313	,725
Item 16	72,8222	60,714	,322	,724
Item 17	73,4519	58,369	,484	,713
Item 18	73,2296	57,835	,503	,711
Item 19	73,5259	56,027	,552	,704
Item 20	73,6519	62,199	,155*	,738
Item 21	73,5185	58,102	,466	,713
Item 22	72,6148	60,388	,373	,721
Item 23	73,8741	61,783	,202*	,733

When the communalities table (Table 3.10) is assessed, it is clear that the variances between the scale items were all above .3, thus meaning that all scale items fit well with each other (Pallant, 2007).

Table 3.10

Communalities for the Turkish Version of Education for Sustainable Development Teaching Beliefs Scale items

	Initial	Extraction
Item 1	1.000	,661
Item 2	1.000	,602
Item 3	1.000	,618
Item 4	1.000	,604
Item 5	1.000	,524
Item 6	1.000	,701
Item 7	1.000	,560
Item 8	1.000	,669
Item 9	1.000	,657
Item 10	1.000	,561
Item 11	1.000	,612
Item 12	1.000	,625
Item 13	1.000	,511
Item 14	1.000	,641
Item 15	1.000	,619
Item 16	1.000	,561
Item 17	1.000	,529
Item 18	1.000	,715
Item 19	1.000	,675
Item 20	1.000	,743
Item 21	1.000	,620
Item 22	1.000	,668
Item 23	1.000	,670

In addition to this, the KMO and Bartlett's test of sphericity values were controlled to verify the suitability of the data for an exploratory factor analysis. Since the Bartlett's test suggests that the null hypothesis must be rejected if there is a significance level of .05 (Snedecor & Cochran, 1989), the results were checked for KMO values and significance level; it was found that KMO = .727 (p = .000) (see Table 3.11).

Table 3.11

The Results of the KMO and Bartlett's Test for the Turkish Version of EfSD-B Scale Items

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.727
Bartlett's Test of Sphericity	Approx. Chi-Square	957.594
	df	253
	Sig.	.000

After assessing the item-total statistics, communalities and the KMO and Bartlett's test of sphericity values, the principle component analysis was conducted. The analysis results, based on the eigenvalues of the factors, showed that the seven-factor solution explained 62.36% of variance, the six-factor solution explained 57.80%, the five-factor solution 52.95%, the four-factor solution explained 47.61%, the three-factor solution explained 41%, the two-factor solution explained 31.66%, and the one-factor solution explained 18.33% of variance (see Table 3.12).

The scree plot and component matrices were also assessed in order to decide on how to maintain EFA for the EfSD-B scale. As seen from the scree plot, the curve reached a stable level after the three factors (see Figure 3.4). However, according to the Component Matrix table, the items were mostly loaded on two factors (see Table 3.13). Indeed, previous values supported the notion of continuing EFA with the two-factor solution, and the original scale was also constructed around two dimensions; given this, EFA was established by forcing the two-factor solution of the scale in order to decide which items should be extracted from the scale to obtain the finalised version which is appropriate for the Turkish and ECE context. Figure 3.4 reveals the first scree plot obtained from the EFA results.

Table 3.12

Total variance for the Turkish Version of Education for Sustainable Development Teaching Beliefs (EfSD-B) Scale items

	Initial Eigenvalues			Extraction Sums of Squared Loadings			
Component	Total	% of Variance		Cumulative %	Total	% of Variance	Cum.%
Item 1	4,217	18,333		18,333	4,217	18,333	18,333
Item 2		3,066	13,329	31,662	3,066	13,329	31,662
Item 3		2,150	9,346	41,008	2,150	9,346	41,008
Item 4		1,520	6,610	47,618	1,520	6,610	47,618
Item 5		1,227	5,335	52,953	1,227	5,335	52,953
Item 6		1,116	4,852	57,805	1,116	4,852	57,805
Item 7		1,049	4,561	62,366	1,049	4,561	62,366
Item 8		,985	4,283	66,649			
Item 9		,870	3,782	70,431			
Item 10		,830	3,611	74,042			
Item 11		,740	3,216	77,258			
Item 12		,686	2,982	80,240			
Item 13		,634	2,757	82,997			
Item 14		,564	2,452	85,449			
Item 15		,495	2,153	87,603			
Item 16		,475	2,066	89,669			
Item 17		,442	1,920	91,588			
Item 18		,385	1,674	93,262			
Item 19		,363	1,578	94,840			
Item 20		,348	1,513	96,353			
Item 21		,317	1,378	97,731			
Item 22		,272	1,183	98,914			
Item 23		,250	1,086	100,000			

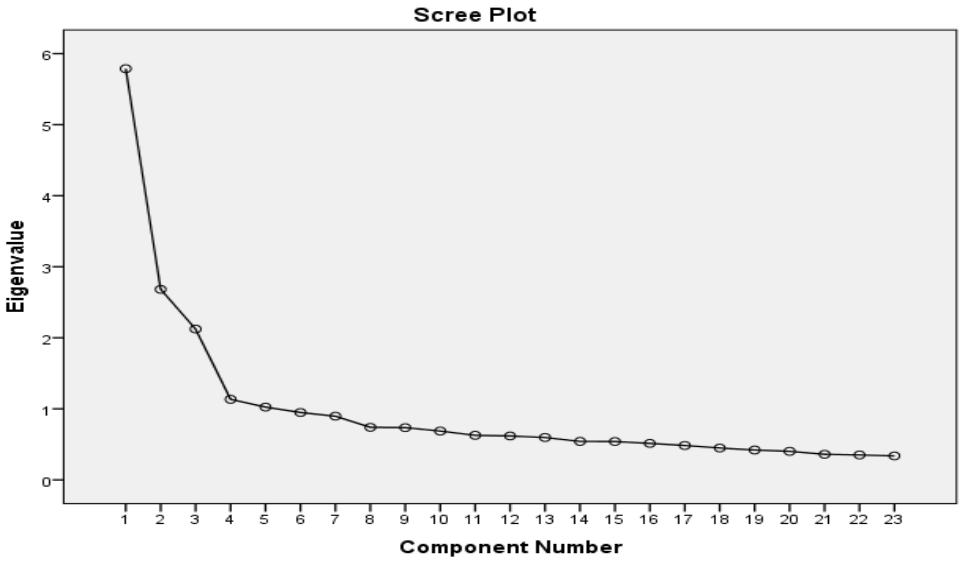


Figure 3.4 *The First Scree Plot for Turkish Version of EfSD-B Scale*

Table 3.13
Component Matrix for the Turkish Version of Education for Sustainable Development Teaching Beliefs Scale items

	Component						
	1	2	3	4	5	6	7
Item 2	,616						
Item 4	,594					,336	
Item 19	,587	,526					
Item 22	,535				,313		
Item 17	,534	,455					
Item 9	,530				-,390		
Item 18	,523			,511	,367		
Item 6	,512	,345			,367		
Item 21	,510	,458					
Item 7	,482	-,329				,303	
Item 23		,581			-,362		,333
Item 15	,412	-,576					
Item 8	,427	,562					
Item 11	,417	-,509					
Item 16	,439	-,480				-,336	
Item 1	,373	-,394				,382	,329
Item 14		-,370	,640				
Item 5			,616	,302			
Item 12			,601		,378		
Item 3	,401		-,493				

Because the results supported the two-factor construct of the EfSD-B scale, EFA was conducted again by forcing the items to the two-factor. Beginning with the second exploratory factor analyses, it was first decided to use one of the most frequently-chosen orthogonal rotation methods, namely Varimax rotation (Pett et al., 2003). Pallant (2007, p. 185) stated that if the researcher wants to "minimize the number of variables that have high loadings on each factor", the Varimax rotation would be the best choice. Given that in the first EFA results there were many factors which had the items loaded on more than one factor, the Varimax rotation method was chosen alongside the two-factor solution while re-conducting EFA.

First, the eigenvalues were assessed in order to describe what percentage of the variance was explained. It was found that, for the two-factor solution, 31.662% of the variance was explained (see Table 3.14).

Table 3.14

Total variance for the Finalized Turkish Version of Education for Sustainable Development Teaching Beliefs Scale items

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cum. %
Item 1	4,217	18,333	18,333	4,217	18,333	18,333
Item 2	3,066	13,329	31,662	3,066	13,329	31,662
Item 3	2,150	9,346	41,008			
Item 4	1,520	6,610	47,618			
Item 5	1,227	5,335	52,953			
Item 6	1,116	4,852	57,805			
Item 7	1,049	4,561	62,366			
Item 8	,985	4,283	66,649			
Item 9	,870	3,782	70,431			
Item 10	,830	3,611	74,042			
Item 11	,740	3,216	77,258			
Item 12	,686	2,982	80,240			
Item 13	,634	2,757	82,997			
Item 14	,564	2,452	85,449			
Item 15	,495	2,153	87,603			
Item 16	,475	2,066	89,669			
Item 17	,442	1,920	91,588			
Item 18	,385	1,674	93,262			
Item 19	,363	1,578	94,840			
Item 20	,348	1,513	96,353			
Item 21	,317	1,378	97,731			
Item 22	,272	1,183	98,914			
Item 23	,250	1,086	100,000			

Smilar to the first EFA results, the scree plot obtained from the second EFA results showed that the curve reached a stable level after the third-factor again. Therefore, other tables obtained from the analysis were checked to determine factor numbers. The Rotated Component Matrix table was controlled to examine the factor loadings on the two-factor solution. According to the Varimax Rotated Component Matrix table, five items (items 5, 10, 12, 13, 19 and 22) were found to be unloaded on the two-factor solution. Moreover, the second item was found to be loaded on the first component, although it belonged to the second component. As such, the items were extracted from the scale respectively, until the scale returned to being two-factor

with strongly loaded items. After extracting the seven items from the scale, EFA was conducted again using Varimax rotation to examine its fitness for the two-factor solution. The results showed that 16 items were loaded on the component matrix with the two-factor solution (see Table 3.15). In addition to this, the scree plot revealed that the two-factor solution curve stabilised after the third point (see Figure 3.5). Thus, it was decided to confirm the scale with 16 items. Stants (2016) preferred to study the scale with its one sub-scale, *PTE,* because of the low internal consistency of the TOE sub-scale. However, similar to Bleicher's (2004) research, the EFA results in the current study revealed that the scale supported the two components of teaching self-efficacy beliefs constructed by Bandura (1997), namely outcome-expectancy beliefs and personal self-efficacy.

Table 3.15

The Component Matrix for Finalized Turkish Version of EfSD-B Scale

	Component	Component
	1	2
Item 11	,731	
Item 15	,708	
Item 4	,702	
Item 16	,673	
Item 14	,667	
Item 9	,648	
Item 7	,614	
Item 1	,611	
Item 21		,762
Item 8		,757
Item 17		,735
Item 6		,720
Item 23		,569
Item 20		,565
Item 3		,556
Item 18		,359

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

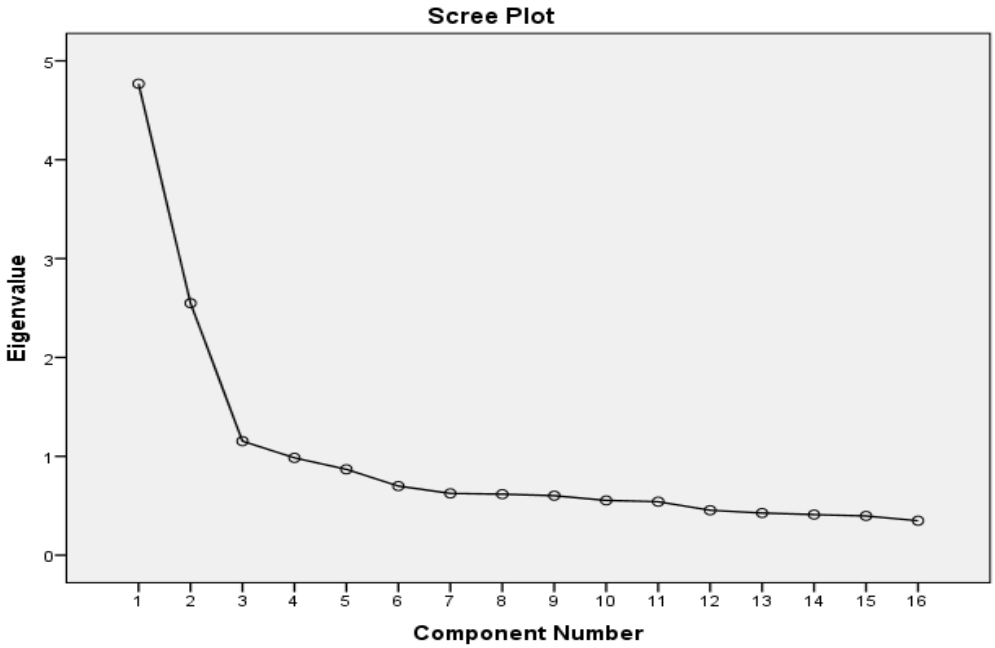


Figure 3.5 *The Final Scree Plot for Turkish Version of EfSD-B Scale*

After finalising the scale items that were found to be appropriate for the Turkish context, the items were checked again in terms of internal consistency. The Cronbach's alpha value for 16 items with two-factor solution was found to be .83. Indeed, this means that the items were strongly correlated (Pallant, 2007) following the extraction of the seven items from the original scale.

3.5.4 *Sustainable Development Knowledge Scale*

The scale used to measure the SD knowledge of pre-service ECE teachers was taken from "The perception and attitude of in-service Early Childhood Education Educators (ECEEs) in early childhood education towards Education for Sustainable Development (EfSD) Survey". A 3-point Likert-type scale asked the respondents to answer by specifying "Agree", "Disagree" or "Uncertain"; it included 5 parts comprising 42 items in total, and was originally constructed by Park, Kim and Yu (2015). The scale was translated and adapted to the Turkish language and context with 42 items by Kahriman-Öztürk (2016); it was also examined in terms of its validity and reliability criteria for the Turkish context.

The first part of the scale collected the demographic information of participants via six questions; this information included gender, age, marital status etc. The second part of the scale measured respondents' perceptions of EfSD using four questions. The third part comprised nine questions which measured the SD knowledge of participants. The fourth part of the scale examined the participants' perceptions of the need for and implementation of EfSD by putting three questions to said participants. Finally, the last part of the scale involved 21 questions which measured pre-service ECE teachers' attitudes towards SD. In the current research, only the third part of the scale, which consisted of nine questions and was adapted by Kahriman-Öztürk (2016), was used to measure pre-service ECE teachers' knowledge of SD.

3.5.4.1 Pilot Study Results of SD Knowledge Scale

The pilot study analysis results for the SD knowledge scale are presented in two parts. First of all, the Cronbach's alpha values are revealed. Following this, the scale items are assessed using EFA. Appendix D includes SD Knowledge Scale items.

3.5.4.1.1 The Reliability of Results

In the current study, nine questions which measured the SD knowledge of pre-service ECE teachers were pilot tested with 158 pre-service ECE teachers. First of all, the internal consistency of the scale was examined by checking the Cronbach's alpha value. The Cronbach's alpha value of the current study for the SD knowledge scale was found to be .72; with this said, a recent study conducted by Kahriman-Öztürk (2016) found this figure to be .81. However, since .76 is above .70, it is acceptable to conclude that the scale is reliable to use and has a good internal consistency. The Cronbach's alpha value for the finalised SD knowledge scale was found to be .76.

3.5.4.1.2 *Exploratory Factor Analysis Results*

After assessing the internal consistency of the scale, the item-scale correlation values were then examined (see Table 3.16). Much like a recent study conducted

by Kahriman-Öztürk (2016), the item-scale correlation value of the fifth item (Item 5: SD implies "Putting the needs of nature before those of humanity") was found to be below .30. Moreover, in the current study, the corrected item-total correlation value of the sixth item (Item 6: SD implies "maintaining high and stable levels of economic growth) was found to be .230.

Table 3.16

Item Total Statistics for Sustainable Development Knowledge Scale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	12,7410	9,382	,432	,701
Item 2	12,6446	9,279	,365	,711
Item 3	12,6824	8,812	,511	,686
Item 4	12,8034	9,079	,489	,691
Item 5	12,2495	9,797	,187	,743
Item 6	12,1059	9,428	,230	,740
Item 7	12,4008	8,646	,474	,691
Item 8	12,4631	8,639	,486	,688
Item 9	12,6957	8,750	,546	,680

When the communalities table (Table 3.17) is checked, it is clear that the variances between the scale items were mostly above .3, thus meaning that the majority of the scale items fit well each other (Pallant, 2007) except for item 5. On the other hand, compared to the item total statistics values, it was found that item 6 fit well with the scale.

Table 3.17

Communalities for the Sustainable Development Knowledge Scale items

	Initial	Extraction
Item 1	1.000	,482
Item 2	1.000	,380
Item 3	1.000	,560
Item 4	1.000	,575
Item 5	1.000	,229
Item 6	1.000	,611
Item 7	1.000	,585
Item 8	1.000	,467
Item 9	1.000	,546

In the next step of the pilot analysis of the SD knowledge scale, before determining the factor construct of the scale, the Barlett's test of sphericity was controlled for the multivariate normality of the distribution and correlation matrix. The value was found to be below .05. As such, the multivariate normality distribution assumption was not violated and it was possible to conduct factor analysis. The EFA results were also checked for the KMO test value, which was found to be .795 (see Table 3.18).

Table 3.18

The Results of the KMO and Bartlett's Test for the SD Knowledge Scale Items

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.795
Bartlett's Test of Sphericity	Approx. Chi Square	942.824
	df	36
	Sig.	.000

The results also revealed that the two-factor solution explained 49.274% and the one-factor solution explained 34.163% of variance (see Table 3.19).

Table 3.19
Total variance for the Sustainable Development Knowledge Scale

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cum. %
Item 1	3,075	34,163	34,163	3,075	34,163	34,163
Item 2	1,360	15,111	49,274	1,360	15,111	49,274
Item 3	,920	10,217	59,491			
Item 4	,782	8,684	68,175			
Item 5	,706	7,839	76,014			
Item 6	,667	7,416	83,430			
Item 7	,572	6,360	89,790			
Item 8	,516	5,739	95,529			
Item 9	,402	4,471	100,000			

However, since the corrected item-total correlation scores and communalities table showed that items 5 and 6 should be controlled with other scores obtained fro Principal Component Analysis, the Component Matrix table was also checked. The results showed that items 5 and 6 were loaded on the second component, although the original scale was constructed around one-factor. On the other hand, the scree plot was assessed and it was inferred that the scree plot curve reached a stable level after the first factor. Therefore, much like Kahriman-Öztürk's (2016) study, it was concluded that the SD Knowledge Scale was retained as the one-factor solution. Figure 3.6 reveals the first scree plot for the SD Knowledge Scale.

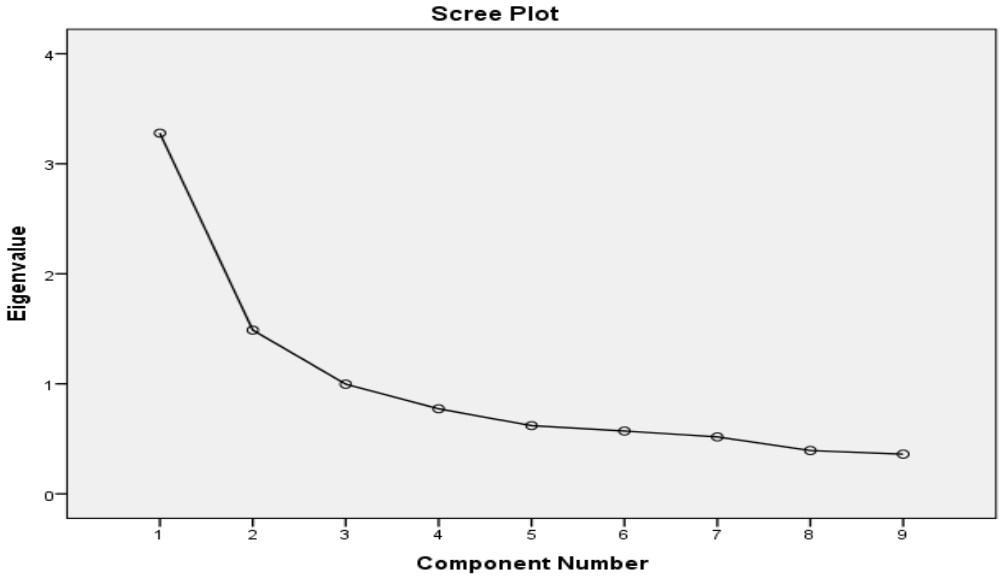


Figure 3.6 *The first EFA Analysis scree plot for SD Knowledge Scale*

Since items 5 and 6 were not loaded on the first component and other results revealed that these items did not fit the one-factor solution, they were extracted from the scale respectively, and EFA was conducted twice. In addition, the Varimax rotation method was used to minimise the variable loadings on different loadings by forcing the one-factor solution.

While examining the second EFA results, the component matrix and scree plot were controlled respectively (see Table 3.20 and Figure 3.7). The results showed that seven items fit well on the scale with the one-factor solution. Therefore, the decision was taken to use the scale with the seven items which were found to be appropriate

for the context.

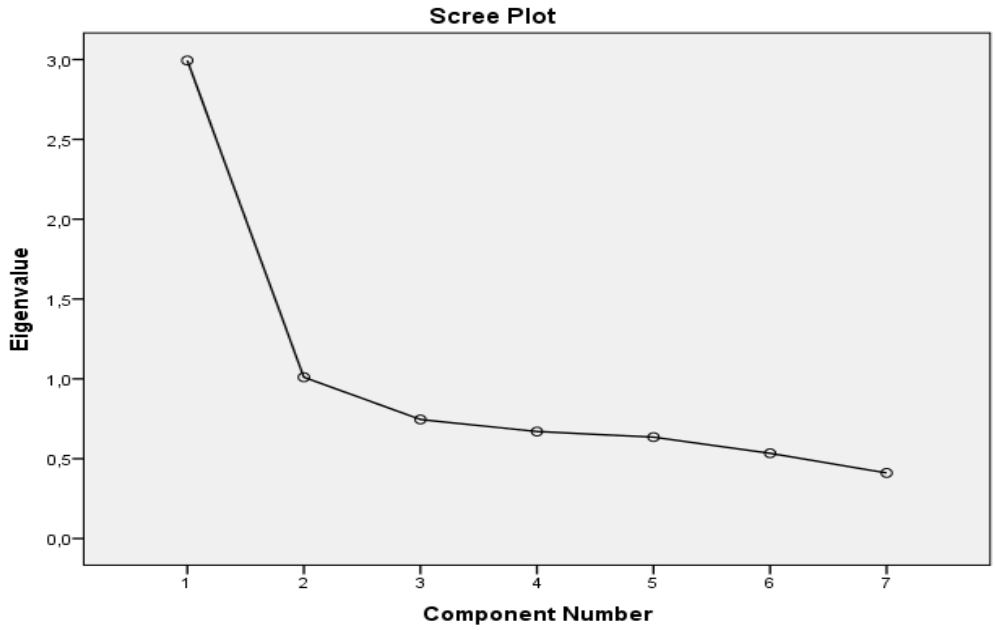


Figure 3.7 *The last EFA Analysis Scree Plot for the Finalized Version SD Knowledge Scale*

Table 3.20
The Component Matrix for the Finalized Version of Sustainable Development Knowledge Scale items

	Component
	1
Item 9	,743
Item 3	,723
Item 4	,723
Item 1	,655
Item 8	,601
Item 7	,571
Item 2	,529

3.6 The Main Study

3.6.1 Data Collection Procedures in the Main Study

Prior to the main study, the pilot study's reliability and EFA results were taken into consideration; the items which did not fit well to the scales were extracted from the questionnaires in order to confirm the scale structures. Following this, research

ethics committee approval from METU was obtained, as was the required permission from other universities in Ankara. In addition to this, a letter which was intended to inform the participants about the current study's purpose was prepared; the purpose of this was to obtain permission from the student teachers if they wanted to participate in the research. During the scheduled time, over two months in the spring semester of the 2016-2017 academic year, the researcher collected the data from the pre-service ECE teachers, who were freshman, sophomore, junior and senior student teachers. The questionnaire process was completed in almost 15 minutes, with the participants asked to give their permission and complete the questionnaire in their classrooms. The participants were not asked to write their names on the questionnaires, but were informed of the purpose of the study.

3.7 Confirmatory Factor Analysis (CFA) of the Scales

After collecting the main data, CFA was conducted by using the Lisrel 8.8 (Jöreskog & Sörbom, 2006) statistical program to examine the goodness of fit statistics, which reveal if the dataset fits the model. According to Hu and Bentler (1999), there are certain guidelines which must be followed while searching the scale, in order to establish if it has a reasonably good fit. Hu and Bentler (1999) reported that SRMR values should be .08 or below; RMSEA values should be close to .08 or below; and lastly, NNFI and CFI values must be close to .90 or greater (Brown, 2006). Moreover, the $\chi 2$/df value should be lower than 5 (Kelloway, 1998). In light of these guidelines, the current research presented the RMSEA, CFI and NNFI values while summarising the CFA results.

3.7.1 CFA Analysis of Attitudes towards Sustainable Development Scale

It was hypothesised that the observed variables ATT1 to ATT16 would be loaded on the latent variable "attitudes towards sustainable development". The hypothesised model, obtained using the Lisrel 8.8 statistical program, can be found in Figure 3.8.

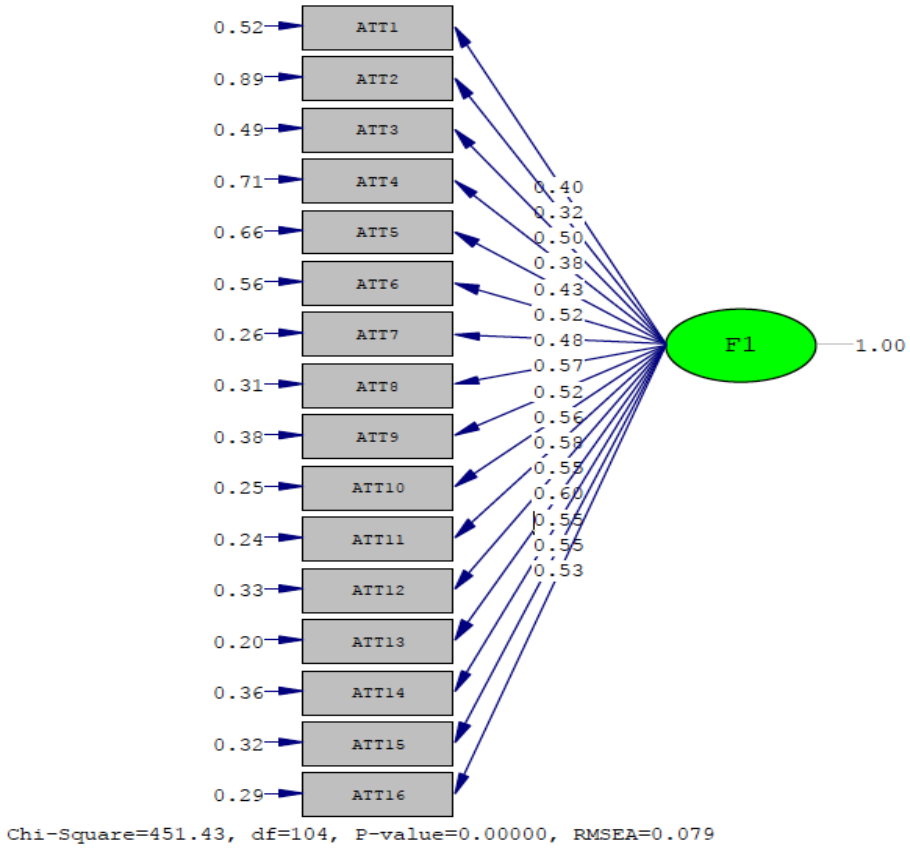


Figure 3.8 *Hypothesized model for 16-Item of Attitudes toward Sustainable Development Scale*

Table 3.21 reveals the goodness of fit statistics between the Attitudes towards Sustainable Development Scale-Turkish Form and the dataset. As seen in the table, the NNFI and CFI values were both greater than .90 (0.96 and 0.98 respectively), which indicated a good fit (Kline, 1998). The RMSEA value was found to be 0.079, thus meaning that good fit was lower than .08 (Browne & Cudeck, 1993). In addition to this, the $\chi 2/df$ value was lower than 5, thus showing a good fit (Kelloway, 1998). Therefore, it was concluded that the one-factor ASD scale has a good fit.

Table 3.21
Lisrell 8.8 Results-Goodness of Fit Indicators of the Models for Attitudes toward Sustainable Development Scale

Model	df	$\chi 2$	$\chi 2$/df	NNFI	CFI	RMSEA
One factor	104	451.43*	4.34	0.96	0.98	0.079

Note. NNFI= non-performed fit index; CFI= comparative fit index; RMSEA= root mean square error of approximation.
*p<.001

3.7.2 The CFA for Education for Sustainable Development Teaching Beliefs Scale

It was hypothesised that the observed variables EFF2, EFF4, EFF6, EFF12, EFF13, EFF14, EFF15 and EFF16 were loaded on the latent variable "outcome-expectancy beliefs" (TOE). Moreover, it was also hypothesised that the observed variables EFF1, EFF3, EFF5, EFF7, EFF8, EFF9, EFF10 and EFF11 were loaded on the variable "personal teaching efficacy beliefs" (PTE). The hypothesised model obtained using the Lisrel 8.8 statistical program can be found in Figure 3.9.

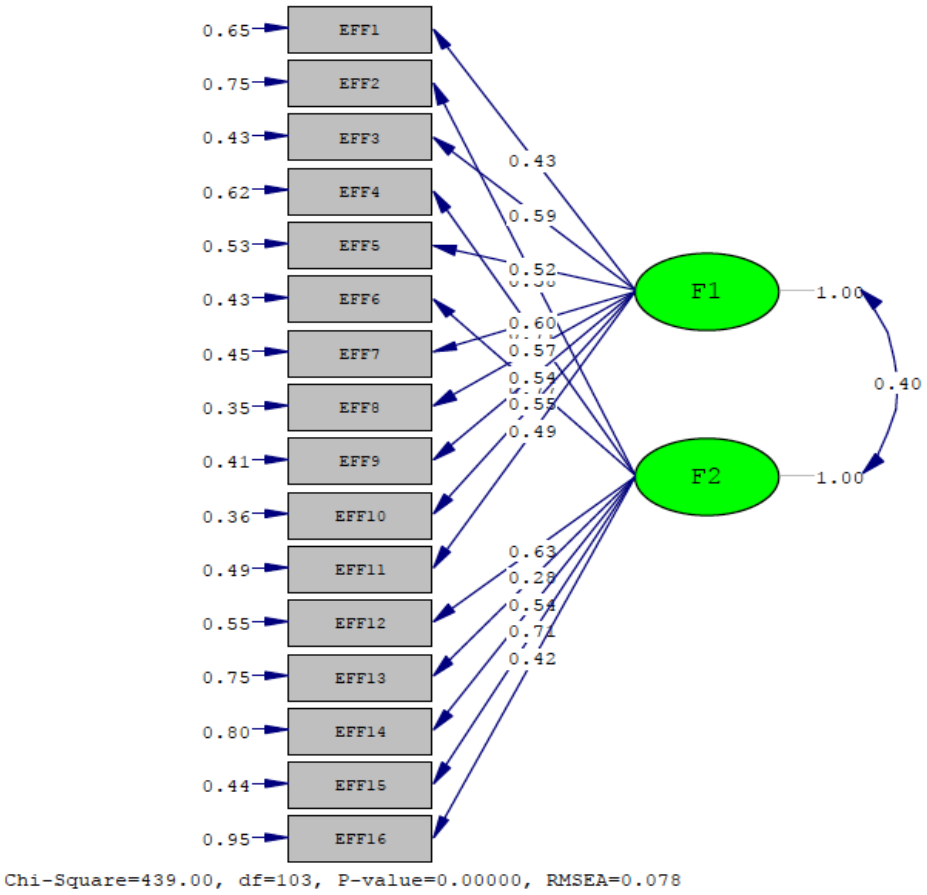


Figure 3.9 *Hypothesized model for 16-Item of Education for Sustainable Development Teaching Beliefs Scale*

Table 3.22 reveals the goodness of fit statistics between Education for Sustainable Development Teaching Beliefs Scale-Turkish Form and the dataset. As seen from the table, the NNFI and CFI values were both greater than .90 (0.95 and 0.99 respectively), which indicated a good fit (Kline, 1998). The RMSEA value was found to be 0.078, thus meaning it had an adequate fit, as it was lower than .08 (Browne & Cudeck, 1993). In addition to this, there was a 4.26 $\chi 2$/df value, which was lower than 5 and thus presented a good fit (Kelloway, 1998). Therefore, it was concluded that the two-factor EfSD-B scale has a good fit.

Table 3.22

Lisrel 8.8 Results-Goodness of Fit Indicators of the Models for Education for Sustainable Development Teaching Beliefs Scale

Model	df	$\chi 2$	$\chi 2$/df	NNFI	CFI	RMSEA
One factor	103	439.00*	4.26	0.95	0.99	0.078

Note. NNFI= non-performed fit index; CFI= comparative fit index; RMSEA= root mean square error of approximation. *p<.001

3.7.3 The CFA for Sustainable Development Knowledge Scale

It was hypothesised that the observed variables KNOW1 to KNOW9 without KNOW 5 and KNOW 6, were loaded on the latent variable "sustainable development knowledge". The hypothesised model obtained with the Lisrel 8.8 statistical program is in Figure 3.10. On the other hand, the NNFI and CFI values could not be obtained. Since Lisrel analyses are too sensitive for missing values, the decision was taken to replace missing data with series mean. Before that, Little's MCAR test was conducted to establish whether or not the missing values were randomly distributed. According to the results, the missing data was found to be distributed randomly, and thus it was possible to replace the data with series mean (see Table 3.23).

Table 3.23

Little's MCAR Test Results

EM Means[a]						
Item 1	Item 2	Item 3	Item 4	Item 7	Item 8	Item 9
1,3578	1,4556	1,4142	1,2971	1,7041	1,6398	1,4019

a. Little's MCAR test: Chi-Square = 30,277, df = 36, Sig. = ,737

Table 3.24 reveals the goodness of fit statistics between Sustainable Development Knowledge Scale-Turkish Form and the dataset. As seen from the table, the NNFI and CFI values were both greater than .90 (.92 and .94 respectively), which indicated a good fit (Kline, 1998). The RMSEA value was found to be .097, which means it did not have an adequate fit, since it was higher than .08 (Browne & Cudeck, 1993). In addition to this, there was a 6.05 $\chi 2$/df value, which did not

present a good fit since it was higher than 5 (Kelloway, 1998). Besides this, in addition to the good fit scores of NNFI and CFI, the p-value, as seen in Figure 3.10, was found to be below .001 (p= .000) (Kelloway, 1998).

Table 3.24
Lisrel 8.8 Results-Goodness of Fit Indicators of the Models for Sustainable Development Knowledge Scale

Model	df	$\chi 2$	$\chi 2$/df	NNFI	CFI	RMSEA
One factor	14	84.83*	6.05	0.92	0.94	0.097

Note. NNFI= non-performed fit index; CFI= comparative fit index; RMSEA= root mean square error of approximation. *p<.001

Considering these results, the decision was taken to control modification indices. According to the suggestions given via modification indices, there was a relationship among the errors which occurred between item 7 and item 8, item 4 and item 8, and item 1 and item 9, thus affecting the scale's model fitness (see Figure 3.10). Therefore, a new model for the SD knowledge scale was created in order to generate appropriate results which could be used to confirm the scale.

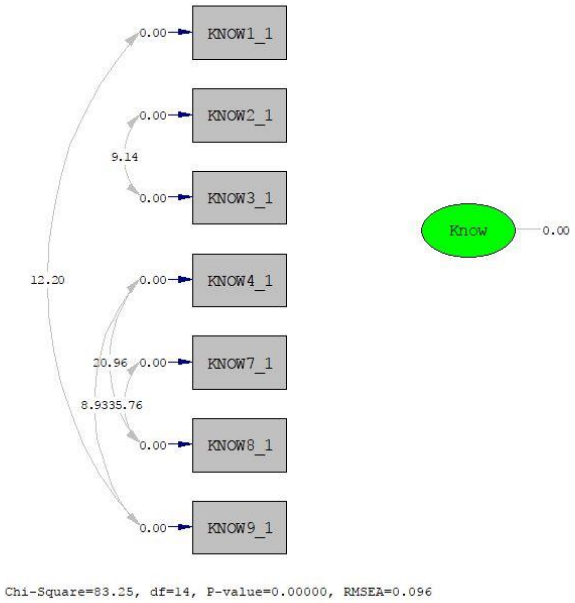


Figure 3.10 *Modification Indices for 7-Item of Sustainable Development Knowledge Scale*

With respect to the new model's CFA results, which were obtained after embracing Lisrel's modification indices suggestions, the new values on each indicator confirmed the scale with new fit indices. According to the new scores presented in Table 3.25, the NNFI and CFI values increased, and both values were greater than .90 (.97 and .98 respectively), which indicated a good fit (Kline, 1998). The RMSEA value was found to be .059, meaning it had a good fit since it was lower than .08 (Browne & Cudeck, 1993). In addition to these, there was a 2.86 $\chi 2$/df value, which was lower than 5 and thus presented a good fit (Kelloway, 1998). Lastly, the p-value, as seen in Figure 3.11, was found to be .001 (p= .000) (Kelloway, 1998).

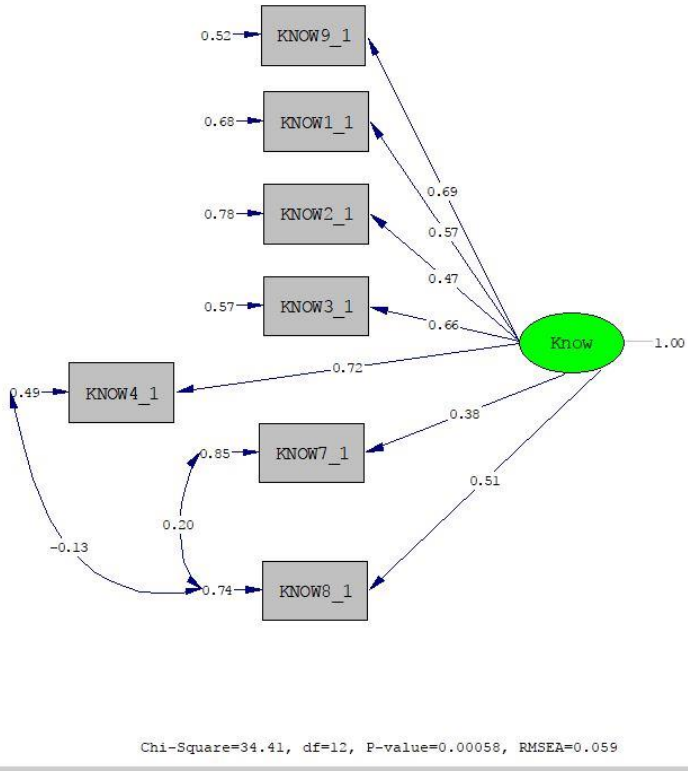


Figure 3.11 *Final Hypothesized Model for 7-Item of Sustainable Development Knowledge Scale*

Table 3.25
Lisrel 8.8 Final Results-Goodness of Fit Indicators of the Models for Sustainable Development Knowledge Scale

Model	df	$\chi 2$	$\chi 2$/df	NNFI	CFI	RMSEA
One factor	12	34.41*	2.86	0.97	0.98	0.059

Note. NNFI= non-performed fit index; CFI= comparative fit index; RMSEA= root mean square error of approximation. *p<.001

3.8 Analysis of the Data

Before the inferential analyses, the collected data was controlled for errors. While analysing the data, the SPSS 22.0 Package program was used. Based on the research questions, descriptive analysis was first conducted to search for general levels in pre-service ECE teachers' EfSD teaching self-efficacy beliefs, SD attitudes, and

SD knowledge. The descriptive statistics results provided information about the means, standard deviations and minimum-maximum values. Secondly, Multivariate Analysis of the Variances (MANOVA) was performed to infer how class, mostly-lived childhood residence, membership to environmentally active student clubs at university and household type during childhood affected pre-service ECE teachers' SD attitudes, EfSD teaching self-efficacy beliefs and SD knowledge levels. Lastly, controlling was also applied to personal self-efficacy beliefs regarding EfSD teaching, SD attitudes and SD knowledge of pre-service ECE teachers, if these had any predictive impact on the teachers' outcome-expectancy beliefs for EfSD teaching.

3.9 Assumptions and Limitations

It is assumed that the pre-service ECE teachers who participated in the study answered the questionnaire items honestly. However, there were three limitations in the current study. First, it had to be assumed that the respondents answered the items accurately. Second, since the study was conducted at universities with a faculty of education in Ankara, it was not possible to generalise the research results to other settings.

3.10 Threats to the Internal Validity

According to Fraenkel and Wallen (2006), internal validity refers to when "… observed differences on the dependent variable are directly related to an independent variable and not due to some unintended variable" (p. 169). However, although the researcher wanted to measure the research variables, some unintended variables could have occurred because of the threats that were not controlled in the process of research. Some of these threats included subjects' characteristics, attitude of subjects, location, instrumentation, testing and history (Fraenkel & Wallen, 2006). However, it is not required to check all threats in a research study, with Fraenkel and Wallen (2006) suggesting that researchers who conduct survey-based research should especially control subject characteristics, mortality, location and instrumentation.

To begin with subject characteristics, Fraenkel and Wallen (2006) reported that the group participating in study is important in terms of its different characteristics. In other words, they stated that a variety of characteristics in the sample can influence the results. To reduce the impact of the threat to the study results, age, gender and autobiographical factors were accepted as unintended variables used to describe the different characteristics of the participants. The present study was carried out with first-, second-, third- and fourth-year pre-service ECE teachers who were mostly similar in age; the majority of the participants were female. Moreover, autobiographical factors were controlled in the study, so as to establish whether they had any effect on the results. Thus, it was concluded that subject characteristics were not a threat to this study.

Secondly, mortality, which is also known as loss of subjects' threat, was controlled. Fraenkel and Wallen (2006) pointed out that mortality occurs when the participants do not fill all the scales. Moreover, it occurs when all participants belonging to the sample do not fill the scales. In order to minimise this threat's effect on the study, first of all, the participants were informed of the study's purpose in detail and asked if they wanted to participate in the study and fill all the scales. In this way, with the exception of one person, all scales were completed appropriately. Moreover, in order to increase the participation, the scales were implemented during compulsory courses suggested by the course instructors. In that way, mortality was controlled in this study.

Thirdly, the location threat was also controlled. According to Fraenkel and Wallen (2006), a researcher should collect data in appropriate locations which are adequately sized, have lighting, and are away from the noise. In the current research, the data was collected in the participants' regular classrooms, with an effort made to keep the same conditions as much as possible. Therefore, the location was also not considered a threat to this study.

Lastly, the instrumentation threat was controlled in order to prevent it threatening the internal validity of the study. This threat included three conditions, namely instrument decay, data collector characteristics and data collector bias (Fraenkel &

Wallen, 2006). In order to minimize the threat's impacts, the scoring of the scales and coding of the items were not changed, and the prints of the surveys were the same in all instrumentations; this provided standardisation for all participants. In that way, the instrument decay threat was controlled. Moreover, the data was collected by the same researcher, and thus the data collector characteristics were also the same in all locations. Finally, the data collector did not mention her hypothesis for the study and, therefore, did not lead the participants as they filled the scales. In that way, the instrumentation threat was prevented with its all conditions required.

CHAPTER 4

RESULTS

This chapter provides detailed information about the findings of the study using five analysis methods. Before starting the main analysis with the research questions, preliminary analysis was carried out in order to assure the assumptions required for the study. With this purpose in mind, missing values were checked so as to establish whether or not there was a need for data imputation. In order to achieve the aim, Little's MCAR test, which is a chi-square test performed to imput missing values completely at random, was conducted (Pallant, 2007).

Secondly, descriptive statistics were applied. Thirdly, Multivariate Analysis of Variance (MANOVA) was conducted in order to determine the effect of membership to a student cub, grade levels, mostly-lived location during childhood and childhood residence on the following: SD attitudes, SD knowledge and EfSD teaching beliefs. Lastly, Standard Multiple Regression analysis (SMR) was performed to determine the predictive roles of SD attitudes, SD knowledge and personal self-efficacy beliefs of EfSD teaching on pre-service ECE teachers' outcome-expectancy beliefs regarding EfSD teaching.

4.1 **Information Related to Auto-Biographical Factors**

While collecting auto-biographical information, the participants were asked to describe pre-service ECE teachers' membership to a student club at university, childhood residence and household type during childhood. The participants were also asked if they took any compulsory and/or elective courses related to SD and EfSD. For the pre-service ECE teachers who took elective courses related to SD and EfSD, they were also asked to specify the number of courses. Table 4.1. provides information about the auto-biographical factors respectively.

Table 4.1
Information about Auto-biographical factors

Course Taken about SD	***F***	***%***
Yes	24	4.4
No	515	95.2
Course Taken about EfSD	***F***	***%***
Yes	16	3.0
No	520	96.1
Mostly Lived Location	***F***	***%***
Village	238	44.1
City Centre	299	55.4
Household Type in Childhood	***F***	***%***
House with garden	215	39.7
Flat	319	59.0
Membership to Environmentally Active Student Clubs	***F***	***%***
Yes	141	26.1
No	394	72.8

4.2 Research Question 1: What are the general patterns of pre-service ECE teachers' EfSD teaching self-efficacy beliefs, SD attitudes, and SD knowledge?

In order to answer the first research question, analysis using descriptive statistics was applied to the data collected through the demographic information form, Attitudes towards Sustainable Development Scale, Education for Sustainable Development Teaching Beliefs Scale and Sustainable Development Knowledge Scale. As seen in Table 4.2, the mean, standard deviation, minimum and maximum values are reported.

Table 4.2
Descriptive Statistics

Name of the Scale	***M***	***SD***	**Min**	**Max**	**N**
Education for Sustainable Development Teaching Beliefs Scale	56.69	8.00	34	80	514
Personal EfSD Teaching Efficacy Sub-scale	30.00	4.64	9	40	533
EfSD Teaching Outcome Expectancy Beliefs Sub-scale	25.92	5.19	8	40	520
Attitudes toward Sustainable Development Scale	68.87	8.24	33	80	509
Sustainable Development Knowledge Scale	10.25	2.87	7	21	528

As clearly shown in Table 4.2, the values revealed that the general EfSD teaching beliefs of pre-service ECE teachers ranged between 34 to 80. Schwarzer (2011) stated that, if there is no criterion to conclude the scale results of the study, it is possible to examine the median scores and compare these with the mean scores. In this context, and in order to make inferences about the general self-efficacy beliefs level for EfSD teaching, the mean score of the EfSD-B scale was controlled (M=56.69); indeed, this was slightly above the median score of 56. Thus, it was concluded that pre-service ECE teachers have a moderate level of self-efficacy

beliefs for EfSD teaching. In addition to this, the scale was examined along with its sub-scales of "personal self-efficacy" and "outcome-expectancy beliefs". It was seen that the EfSD teaching outcome-expectancy beliefs of pre-service ECE teachers ranged from 8 to 40, with a mean score of 25.92, and a median score of 26, which was slightly above the average. This means that pre-service ECE teachers have a moderate level of outcome-expectancy beliefs regarding EfSD teaching. Similarly, personal EfSD teaching efficacy beliefs of pre-service ECE teachers ranged from 9 to 40, with a mean score of 30 and a median score of 31; this was a hardly-noticeable difference from the mean score. Thus, it was concluded that pre-service ECE teachers have moderate personal self-efficacy beliefs regarding EfSD teaching. Additionally, when comparing the sub-scales, it can be seen that the mean scores of the participants for EfSD teaching personal self-efficacy beliefs were higher (M=30, min=9, max=40) than the outcome-expectancy beliefs for EfSD teaching (M=25.92, min=8, max=40).

In order to describe the EfSD teaching self-efficacy beliefs items with the lowest and highest mean scores, Table 4.3 was created. According to the descriptive statistics results in Table 4.3, the item with the lowest mean score (*M=3.08*) revealed that pre-service ECE teachers were not sure about their own ability to capture young children's interest in sustainable development issues. The item was "I do not know what to do to turn pre-school children on to sustainable development"; indeed, the most-selected answer, by 36% of the participants, was "undecided", while the secondly most-selected, by 24% of participants, was "agree". This means that the pre-service ECE teachers who chose the "agree" item and provided certain information about the item, did not know how to attract the children to the SD-related issues. Additionally, another item with a low mean score (*M=3.22*) indicated that the pre-service teachers were also not sure of themselves in terms of how to explain the importance of SD to young children. The item was "I will find it difficult to explain to early childhood students why sustainable development is important"; the most-selected answer, by 37% of participants, was "undecided", while the second most-chosen, by 31% of participants, was "agree". This again showed that the pre-service teachers who were not undecided about the

answer and mostly reported “agree” after “undecided”, did not know how to teach early childhood children about the significance of SD. However, they believed that ECE teachers are the agents who are responsible for teaching sustainable development issues, and this item had the highest mean score (*M=3.98*). The item was “The teacher is generally responsible for the increase in interest and knowledge of young children in sustainable development”; indeed, 52% of participants answered this item with “agree”. Furthermore, the item with the second-highest mean score (*M=3.90*) revealed that pre-service ECE teachers believed that their effective EfSD teaching influenced young children’s interest in, and knowledge of, SD issues. The item was “Improvement/progress in early children’s interest and knowledge in sustainable development is directly related to their teacher's effectiveness in sustainable development teaching”; this was affirmed by 54% of participants. These results reveal that, even though the participants believed that ECE teachers are responsible for turning children’s interest and knowledge on to sustainable development topics, they do not know how to do that. Moreover, although they believed that children’s tendency to learn SD and engage in SD issues depends on their teaching efficacy, they found teaching children about SD to be difficult.

In addition to the descriptive findings of the EfSD-B scale, the results based on the SD attitudes scale were examined in the same way, and the scores showed that, compared with the median score of 70, pre-service ECE teachers had a slightly high level of attitudes towards SD (*M*=68.87, min=33, max=80). Table 4.4 describes the sustainable development attitudes of pre-service ECE teachers. According to the table, the pre-service ECE teachers had a positive attitude towards biodiversity, with the lowest mean score (*M= 3.69*). The table reveals that 36.4% of the participants answered the item “Biodiversity should be protected at the expense of industrial agricultural production” with “agree”, while 23.3% of the participants chose the “strongly agree” option. On the other hand, the item with the highest mean score (*M=4.59*) demonstrated that all countries in the world have the potential to spread peace. It was inferred that 68.4% of the participants answered the item “Each country can do a lot to keep the peace in the world” by marking “strongly agree”.

Besides this, the item with the second-highest mean score (*M=4.49*) revealed that there should be gender equality while providing opportunities in society. The item was "The society should further promote equal opportunities for males and females"; indeed, 63.6% of pre-service ECE teachers chose the "strongly agree" option. Each item's mean scores and percentages showed that the pre-service ECE teachers mostly had a positive attitude towards sustainable development issues, from the item with the lowest mean score to the highest.

In addition to the results for EfSD-B and the ASD scale, the SD knowledge scale was described and the scores showed that the pre-service ECE teachers' SD knowledge scores ranged from 7 to 21, and exhibited a moderate level of knowledge, as the median score of 10 was slightly below the mean score (*M*=10.25). Table 4.5 reveals the sustainable development knowledge descriptions of pre-service ECE teachers, with the percentages and mean scores. The table shows that 76.3% of the participants selected "agree" in relation to the item "SD implies; exploiting natural resources for human benefit while maintaining critical natural capital" (*M=1.29*). In addition, the item with the highest mean score (*M=1.70*) indicated that 44.4% of the participants selected the "agree" option for the item "SD implies; a significant degree of local production and consumption". These results showed that most of the participants agreed with all items on the SD knowledge scale, since the majority marked "agree".

Table 4.3
Descriptive Statistics for Education for Sustainable Development Teaching Beliefs Scale

		Strongly Disagree		Disagree		Undecided		Agree		Strongly Agree	
	M	f	%	f	%	f	%	f	%	f	%
Item 9. The teacher is generally responsible for the increase in interest and knowledge of early childhood students in sustainable development.	3.98	7	1.3	22	4.1	85	15.7	284	52.5	143	26.4
Item 10. Improvement/progress in early childhood students' interest and knowledge in sustainable development is directly related to their teacher's effectiveness in sustainable development teaching.	3.90	7	1.3	20	3.7	106	19.6	294	54.3	113	20.9
Item 12. I will find it difficult to explain to early childhood students why sustainable development is important.	3.22	21	3.9	100	18.5	204	37.7	168	31.1	47	8.7
Item 16. I do not know what to do to turn early childhood students on to sustainable development.	3.08	31	5.7	120	22.2	198	36.6	131	24.2	59	10.9

Table 4.4

Descriptive Statistics for Attitudes toward Sustainable Development Scale

		Strongly disagree		Disagree		Undecided		Agree		Strongly Agree	
	M	F	%	f	%	f	%	f	%	f	%
Item 2-Biodiversity should be protected at the expense of industrial agricultural production	3.69	8	1.5	59	10.9	146	27	197	36.4	126	23.3
Item 7-Each country can do a lot to keep the peace in the world	4.59	3	0.6	8	1.5	26	4.8	132	24.4	370	68.4
Item 8-The society should further promote equal opportunities for males and females	4.49	7	1.3	10	1.8	34	6.3	145	26.8	344	63.6

Table 4.5

Descriptive Statistics for Sustainable Development Knowledge Scale

		Agree		Undecided		Disagree	
	M	f	%	f	%	f	%
4. SD implies; exploiting natural resources for human benefit while maintaining critical natural capital	1.29	413	76.3	90	16.6	35	6.5
5. SD implies; a significant degree of local production and consumption.	1.70	240	44.4	219	40.5	80	14.8
6. SD implies; helping people to avoid starvation and disease.	1.64	264	48.8	205	37.9	70	12.9

4.3 Research Question 2: Do pre-service ECE teachers' SD attitudes, EfSD teaching self-efficacy beliefs and SD knowledge levels differ with respect to auto-biographical factors (grade levels, membership to a student club at university, childhood residence, household type during childhood)?

In order to answer the second research question, one-way between groups multivariate analysis of variance (MANOVA) was performed. MANOVA examines two or more continuous dependent variables which are influenced by more than one categorical independent variable (Tabachnick & Fidell, 2013). In the current study, since there were more than one dependent variable and independent variable, MANOVA was deemed an appropriate statistical test with which to address the research question. To conduct MANOVA, the first required assumptions were controlled, regardless of whether or not they were ensured.

4.3.1 Multivariate Analysis of Variance (MANOVA) Assumptions

To begin with MANOVA assumptions, according to Tabachnick and Fidell (2013), the sample size should be bigger than 50+8M (*M*= number of independent variables). Since the sample included 541 participants, the assumption was ensured. After checking the sample size, the normality assumption was assessed by examining the skewness and kurtosis values. The results showed that the skewness and kurtosis values were between -2 and +2. Continuing with the outliers assumption, it was suggested that, while conducting MANOVA, multivariate normality should also be checked to detect the outliers (Pallant, 2007); therefore, Multivariate normality analysis was performed by checking Mahalanobis distance. While assessing the Mahalanobis distance scores, the maximum values for each participant was controlled; the extreme value was found to be 26.572. Since the critical value for the studies with three dependent variables was 16.27, the participants who were too distant from the critical value and had extreme scores were found in the sample and deleted from the study (Pallant, 2007). By performing these procedures, both the normality and outliers assumptions were ensured. Following this, the linearity assumption was controlled by the matrix of scatterplots

between dependent and independent variables. The scatterplots for each variable showed that there was no violation of the linearity assumption (see Figure 4.1).

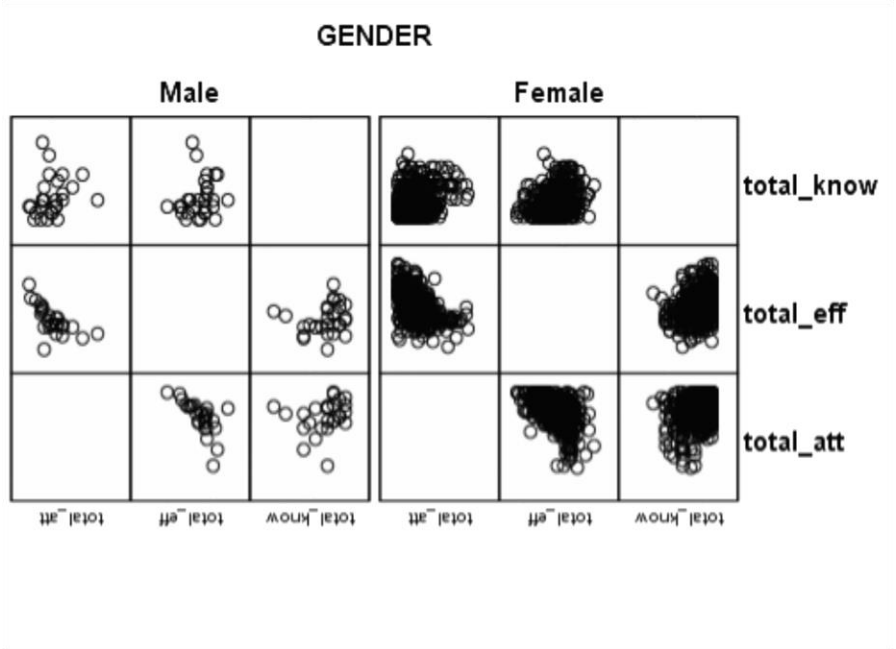


Figure 4.1 *Scatterplots for each group*

In addition to these assumptions, the multicollinearity and singularity assumption, which gives information between the dependent variables, was controlled. Pallant (2007) reported that the dependent variables should not be highly correlated and correlation coefficients higher than .7 are signs of violation of the assumption. In the current study, the values ranged from -.26 to .51; this meant that the assumption was ensured (see Table 4.6).

Table 4.6

Correlation between Pre-service ECE Teachers' EfSD Teaching Beliefs, SD Attitudes and SD Knowledge

	EfSD Teaching Beliefs	SD Attitudes	SD Knowledge
EfSD Teaching Beliefs	-	.517**	-.284**
SD Attitudes		-	-.267**
SD Knowledge			-

**p<.01

And lastly, homogeneity of the variance-covariance matrices was checked using Box's M Test of Equality of Covariance Matrices. While ensuring the assumption, the significance value for Box's M Test of Equality of Covariance Matrices was controlled if it was greater than .001 (Pallant, 2007). In the present research, the significance value was .038; therefore, the assumption was not violated.

4.3.2 MANOVA Results

After ensuring all assumptions, MANOVA was performed to examine autobiographical differences in SD attitudes, SD knowledge and EfSD teaching self-efficacy beliefs. Three dependent variables were used in the study, namely SD attitudes, SD knowledge and EfSD teaching self-efficacy beliefs. Moreover, there were four independent variables, namely membership to environmentally active student clubs at university, mostly-lived location during childhood, household type during childhood and grade levels.

4.3.2.1 MANOVA Results for "Membership to Environmentally Active Student Clubs at University"

It is fitting to begin with the effect of membership to environmentally active student clubs at university on the dependent variables. According to the analysis results, it was found that there was a statistically significant difference between those students who were a member of environmentally active student clubs and non-member students on the combined dependent variables, F (4, 467) = 2462, p=.04; Wilk's Lambda= .97; partial eta squared: .99 (see Table 4.7).

Table 4.7

Multivariate Test

	Wilk's Lambda	F	Sig.	Partial Eta Squared
Membership to Environmentally Active Student Clubs	.979	2462	.045	.991

However, although the significance value showed that there was a statistically significant difference between the student club members and non-members on dependent variables, the Bonferroni adjustment was performed in order to reduce the type I error. Type I error occurs when there is no significant difference but the sig. value concludes that the results are significant. While doing this, the original alpha level .05 was divided by 3, which is the number of dependent variables, and the new alpha value was found to be .017. Following this, the significance values were checked for each dependent variable by using a Bonferroni adjusted alpha level of .017. The results revealed that there were no dependent variables with alpha values smaller than .017; therefore, type I error was eliminated and it was concluded that there was no statistically significant difference between club members and non-members on combined dependent variables. The scores are shown in Table 4.8.

Table 4.8

MANOVA Results for Being Member of Environmentally Active Student Clubs in University regarding SD Attitudes, EfSD Teaching Beliefs and SD Knowledge

Source	Dependent Variables	F	P	Partial Eta Squared
Membership to Environmentally Active Student Club	SD Attitudes	4877	.028	.010
	EfSD Teaching Beliefs	.318	.573	.001
	SD Knowledge	.361	.548	.001

**Note.* Multivariate *F* ratios generated from Wilk's lambda statistic. *Sig.* alpha level was arranged as .017 by Bonferroni adjustment.

4.3.2.2 MANOVA Results for "Mostly-Lived Location during Childhood"

Secondly, the effect of mostly-lived place during childhood on the combined dependent variables was checked. The results revealed that there was no statistically significant difference between the participants' mostly-lived location on combined

dependent variables *F* (3, 473) = .640, *p*=.58; Wilk's Lambda= .99; partial eta squared: .00 (see Table 4.9).

Table 4.9
Multivariate Test

	Wilk's Lambda	F	Sig.	Partial Eta Squared
Mostly Lived Location during Childhood	.996	.640	.589	.004

Therefore, because there was no difference between the variables, the non-significant result meant that it was not possible to use this to check other statistics tables which gave information about multiple comparisons between variables and mean scores with standard deviations.

4.3.2.3 MANOVA Results for "Household Type during Childhood"

Continuing with the effect of childhood residence on dependent variables, according to the MANOVA results, it was found that there was no statistically significant difference between household type during childhood on the combined dependent variables, *F* (3, 468) = 2.086, *p*=.10; Wilk's Lambda= .98; partial eta squared: .01 (see Table 4.10). Thus, since there was no difference between the variables, the non-significant result meant that it was impossible to use this to check other statistics tables which gave information about multiple comparisons between variables and mean scores with standard deviations.

Table 4.10
Multivariate Test

	Wilk's Lambda	F	Sig.	Partial Eta Squared
Household type in childhood	.987	2.086	.101	.013

4.3.2.4 MANOVA Results for "Grade levels"

After checking the effect of membership to environmentally active student clubs, mostly-lived locations and household type during childhood on the combined dependent variables, the grade levels of participants were also controlled if it had an effect. According to the MANOVA results, it was inferred that there was a statistically significant difference between grade levels on the combined dependent variables, *F* (9, 1419) =2.531, *p*=.00; Wilk's Lambda= .95; partial eta squared: .01 (see Table 4.11).

Table 4.11
Multivariate Test

	Wilk's Lambda	F	Sig.	Partial Eta Squared
Grade level	.953	2.531	.007	.016

Following this, and based on the Bonferroni adjustment alpha value .017, the significance values were checked for each dependent variable. The results indicated that there was a statistically significant difference between grade levels on SD attitudes (see Table 4.12).

Table 4.12
MANOVA Results for Grade levels regarding SD Attitudes, EfSD Teaching Beliefs and SD Knowledge

Source	Dependent Variables	*F*	*P*	Partial Eta Squared
Grade level	SD Attitudes	4.447	.004*	.027
	EfSD Teaching Beliefs	2.670	.047	.017
	SD Knowledge	2.892	.035	.018

**Note.* Multivariate *F* ratios generated from Wilk's lambda statistic. *Sig.* alpha level was arranged as .017 by Bonferroni adjustment.

Since there was a significant difference found between grade levels regarding SD attitudes, the groups with higher and lower scores were defined. To define the group differences, univariate analysis of the variances was conducted, and mean scores were controlled. The results showed that there was a mean difference among the grade levels regarding SD attitudes, F (3, 473) =4.447, p <.017, partial eta squared= .00. Therefore, since the grade levels had more than three categories, a Post-hoc test was conducted with Tukey, which yielded information about the multiple comparisons among the grade levels. According to the results given in Table 4.13, freshman students were significantly different from the junior students in terms of SD attitudes; there was no significant difference between the freshman, sophomore and senior students regarding SD attitudes. Moreover, it was found that there was a significant difference between the junior and senior students regarding SD attitudes.

Table 4.13
Multiple Comparison- Tukey HSD

Dependent Variable	(I)Grade level	(J)Grade level	Mean Difference (I-J)	Std. Error	Sig.
Total Attitudes	Freshman	Sophomore	.7303	1.03225	.894
		Junior	3.0742*	1.01049	.013
		Senior	-.1099	1.03440	1.000
	Sophomore	Freshman	-.7303	1.03225	.894
		Junior	2.3438	.99901	.089
		Fourth class	-.8402	1.02319	.844
	Junior	Freshman	-3.0742*	1.01049	.013
		Sophomore	-2.3438	99901	.089
		Senior	-3.1841*	1.00124	.009
	Senior	Freshman	.1099	1.03440	1.000
		Sophomore	.8402	1.02319	.844
		Junior	3.1841*	1.00124	.009

*The mean difference is significant at the Bonferroni adjusted alpha level .017

Furthermore, the mean scores indicated that freshman (*M*=70.03, SD= 6.73) and senior students (*M*=70.24, SD=6.94) had higher levels of SD attitudes than the junior (*M*=66.96, SD=9.66) and sophomore class of pre-service ECE teachers respectively (*M*= 69.30, SD= 7.43) (see Table 4.14).

Table 4.14

Mean Scores and Standard Deviations of Grade levels regarding SD Attitudes

	Grade levels	*M*	*SD*
SD Attitudes	Freshman	70.0354	6.73070
	Sophomore	69.3051	7.43692
	Junior	66.9612	9.66421
	Senior	70.1453	6.94345

4.4 Research Question 3: How well do pre-service ECE teachers' personal self-efficacy beliefs of EfSD teaching, SD attitudes and SD knowledge predict their outcome-expectancy beliefs regarding EfSD teaching?

In order to answer the third research question, Standard Multiple Regression (SMR) analysis was conducted. In the present study, at first, there were three dependent variables, namely SD attitudes, SD knowledge and EfSD teaching self-efficacy beliefs. In order to investigate general EfSD teaching self-efficacy beliefs in SMR analysis, the EfSD-B scale's two dimensions were taken into consideration, namely *personal teaching efficacy* (PTE), as an independent variable, and *teaching outcome-expectancy* (TOE), as a dependent variable. SD attitudes and SD knowledge were also accepted as independent variables in SMR analysis. Before conducting the analysis, preliminary analyses were performed to ensure that there was no violation of the assumptions of sample size, outliers, normality, linearity, multicollinearity and homoscedasticity, independence of errors, and absence of outliers.

4.4.1 Standard Multiple Regression Assumptions

Beginning with the sufficiency of the sample size, Tabachnick and Fidell (2013) stated that, in SMR analyses, the sample size must be larger than 50+8M (*M*= number of independent variables). Based on their suggestion, after the necessary computations were carried out, it was seen that the assumption was ensured with 541 participants.

Following this, as SMR analysis is very sensitive to the outliers (Pallant, 2007), they were controlled before conducting the analysis. Given that Pallant (2007) suggested deleting, rescoring or transforming the outliers' scores, the outliers detected in the study were deleted before the analyses.

In continuing with normality, linearity and homoscedasticity, the Normal probability plot (P-P) of the Regression Standardized Residual and scatterplot was checked. Figure 4.2 showed that the points lay in a straight line from bottom left to top right. Moreover, the scatterplot revealed that the residuals were rectangular shaped and mostly distributed in the centre (Tabachnick & Fidell, 2013) (see Figure 4.3). Therefore, it was concluded that the normality assumption was not violated.

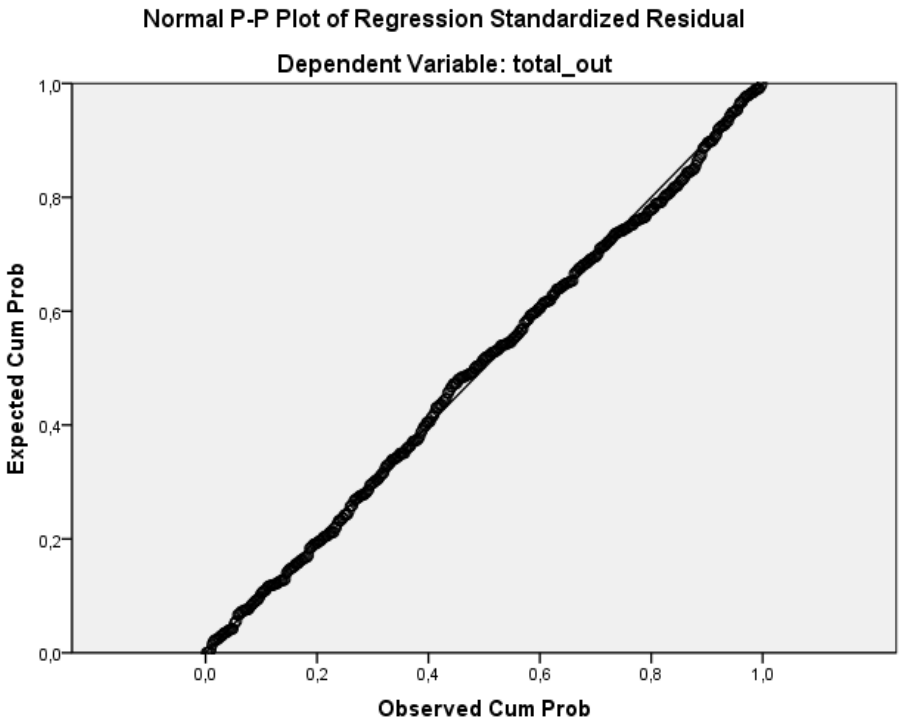


Figure 4.2 *Normal Probability Plots (P-P) of Regression Standardized Residuals*

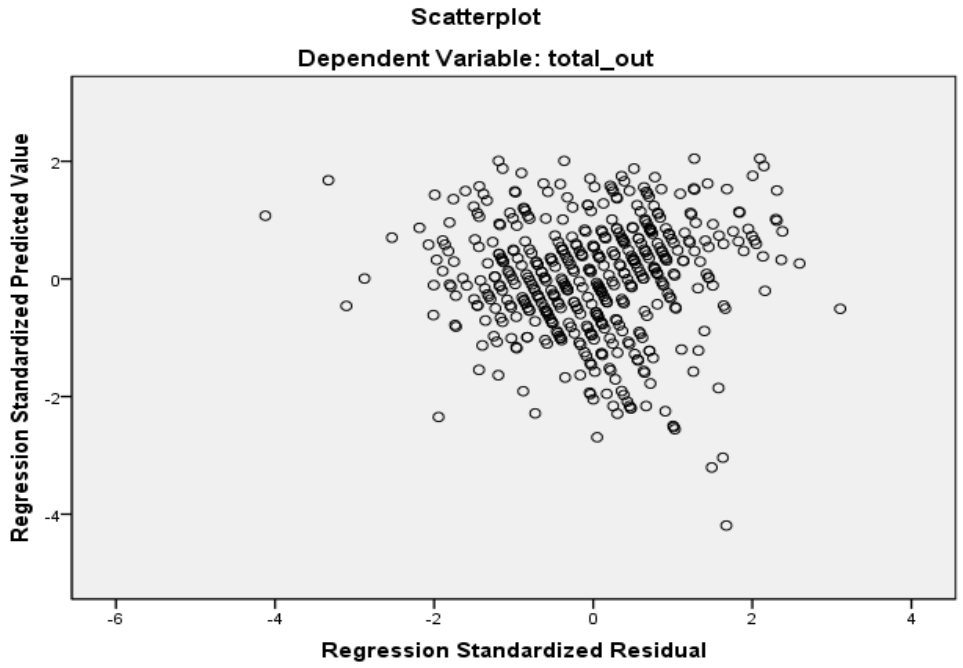


Figure 4.3 *The Scatter Plot*

While checking multicollinearity, the Pearson Product-Moment Correlation analysis was conducted. Pearson correlations were also investigated to find the relationship between SD attitudes, SD knowledge, personal self-efficacy towards EfSD teaching, and outcome-expectancy beliefs regarding EfSD teaching (see Table 4.19). According to Pallant (2007), in order to ensure multicollinearity assumption, the correlations between the variables in the model have scores under .7. . Indeed, the r values between the variables were controlled and examined that all variables had a correlation between themselves with the scores less than .7. Therefore, the assumption was not violated. Besides this, the analysis results revealed that there was a positive and fairly strong correlation between pre-service ECE teachers' personal self-efficacy beliefs regarding EfSD teaching and SD attitudes ($r=.582$, $p<.01$). Therefore, it was inferred that as the SD attitudes of the pre-service ECE teachers increased, their personal self-efficacy beliefs about EfSD teaching also increased. Furthermore, the r value showed that the correlation was significant, and its strength was substantial (Cohen, 1988). Moreover, the coefficient determination was computed by squaring the r value; this yielded a figure of .34. It means that the ASD scale explained 34% of the variance in their scores in the PTE sub-scale.

The results also showed that there was a positive correlation between pre-service ECE teachers' outcome-expectancy beliefs in EfSD teaching and SD attitudes ($r=.32$, $p<.01$). Therefore, it was concluded that as the SD attitudes of the pre-service ECE teachers increased, their outcome-expectancy beliefs about EfSD teaching also increased. Furthermore, the r value revealed that the correlation was significant, and its strength was medium (Cohen, 1988). Moreover, the coefficient determination was obtained by squaring the r value, which yielded a figure of .11. It means that the ASD scale explained 11% of the variance in their scores in the TOE sub-scale.

The analysis results also demonstrated that there was a negative correlation between pre-service ECE teachers' outcome-expectancy beliefs for EfSD teaching and SD knowledge ($r=-.22$, $p<.01$). Thus, it was inferred that as the SD knowledge of the

pre-service ECE teachers increased, their outcome-expectancy beliefs about EfSD teaching decreased; alternatively, if the EfSD teaching outcome-expectancy beliefs of pre-service ECE teachers increase, their SD knowledge levels decrease. Furthermore, with respect to the r value, although the correlation was significant, its strength was small (Cohen, 1988). Moreover, the coefficient determination was calculated by squaring the r value, which yielded a figure of .05. This means that the SD knowledge scale explained 5% of the variance in their scores on the EfSD-B scale.

Furthermore, the results indicated that there was a negative correlation between pre-service ECE teachers' SD attitudes and SD knowledge ($r=-.27$, $p<.01$). Therefore, it was noted that, as the SD attitudes of the pre-service ECE teachers increased, their knowledge about SD decreased. Furthermore, according to the r value, although the correlation was significant, its strength was small (Cohen, 1988). Moreover, the coefficient determination was calculated by squaring the r value, which yielded a figure of .07. It means that the SD knowledge scale explained 7% of the variance in their scores in the ASD scale. Above all, it seems that, for all variables, there was a correlation between them and the scores less than .7 (Pallant, 2007). Hence, the multicollinearity assumption was not violated, and all variables in the model were retained for the SMR analysis. The results of the correlation analysis with all variables are presented in Table 4.15.

Table 4.15

Correlation between Pre-service ECE Teachers' SD Attitudes, SD Knowledge, Personal Teaching Efficacy for EfSD (PTE) and Teaching Outcome Expectancy regarding EfSD (TOE)

	PTE	OUT	SD Attitudes	SD Knowledge
PTE	-	.326**	.582**	-.248**
TOE		-	.282**	-.222**
SD Attitudes			-	-.267**
SD Knowledge				-

**. Correlation is significant at the .01 level.

Moreover, the collinearity diagnostics with Tolerance and VIF values were checked. Tolerance scores provide information about "how much of the variability

of the specified independent is not explained by the other independent variables in the model" and should be higher than .10 (Pallant, 2007, p. 158). In addition, VIF (Variance inflation factor) scores are the opposite of the Tolerance scores, and must be less than 10. Based on this information, the VIF values and Tolerance scores were controlled; this revealed that the multicollinearity assumption was ensured (see Table 4.16).

Table 4.16
Tolerance and VIF Values

Model	Collinearity Statistics	
	Tolerance	VIF
SD Attitudes	,645	1,550
SD Knowledge	,916	1,092
EfSD Personal Teaching Efficacy	,652	1,533

Dependent Variable: Outcome expectancy beliefs of EfSD teaching

After checking the Tolerance and VIF scores, the independence of errors assumption was checked using the Durbin-Watson value. Tabachnick and Fidell (2013) reported that the Durbin-Watson value must be between 1.5 and 2.5. In the current study, the value was found to be 1.912, which indicated that the assumption was ensured.

Finally, the absence of the outliers assumption was controlled with Mahalanobis distance and Cook's distance Maximum values handled in a Residuals statistics table. Pallant (2007) pointed out that the number of independent variables in SMR analyses determines the critical value and determines the outliers which have higher Mahalanobis scores than the critical value. In the current study, since there were three independent variables for SMR analyses, the critical value was 16.27 (Pallant, 2007). Based on the critical value, the sample's Mahalanobis scores were ascended; indeed, this revealed that there were two participants with higher Mahalanobis distance scores than the critical value. However, since the extreme values were not too distant from the critical value, they were retained. Indeed, this is linked to the suggestion that the outliers should be kept if they are not too much or too distant

from the critical value (Tabachnick & Fidell, 2013; Pallant, 2007); they were not deleted from the sample before conducting the analyses. Table 4.17, below, reveals the residual statistics for Mahalanobis distance and Cook's distance values.

Table 4.17
Residual Statistics

	Minimum	Maximum	Mean	Standard Deviation	N
Mahal. Distance	.39	18.572	2.968	3.125	541
Cook's Distance	.000	.107	.003	.008	541

4.4.2 Standard Multiple Regression Analysis Results

After ensuring all assumptions, standard multiple regression analysis was used to assess the ability of the three control measures (ASD scale, SD knowledge scale and PTE subscale regarding teaching EfSD) to predict levels of outcome-expectancy for EfSD teaching measured using the TOE subscale. Following this, SMR analysis was conducted.

First, the ANOVA table was examined to obtain information about the significance of the model. According to the ANOVA table, the model predicted the scores for the outcome-expectancy beliefs of pre-service ECE teachers regarding EfSD teaching (see Table 4.18).

Table 4.18
ANOVA Table for the Whole Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1799,716	3	599,905	25,530	,000
	Residual	11443,429	487	23,498		
	Total	13243,145	490			

Predictors: Personal EfSD Teaching Efficacy, SD Knowledge, SD Attitude
Dependent Variable: Outcome Expectancy Beliefs of EfSD Teaching

The results showed that the model significantly accounted for 17.3% of the variation in pre-service ECE teachers' outcome-expectancy beliefs for EfSD teaching (F=25.530, $p<.01$). Moreover, it was inferred that SD attitudes (β= .115, p=.029), SD knowledge (β= -.135, p=.002) and personal EfSD teaching efficacy made a statistically significant and unique contribution to the equation (β= .226, p=.000). According to the analysis results, total PTE values made the strongest contribution in predicting pre-service ECE teachers' outcome-expectancy beliefs regarding EfSD teaching. Respectively, SD knowledge and SD attitudes made less of a contribution in predicting outcome-expectancy beliefs in terms of EfSD teaching. Examining the results, it can be inferred that the personal EfSD teaching efficacy is the most determinant factor while predicting the outcome-expectancy beliefs of pre-service ECE teachers. Moreover, it can be stated that, if the SD attitudes and personal EfSD teaching efficacy of pre-service ECE teachers increase, their outcome-expectancy beliefs regarding EfSD teaching also increase. However, the results indicated a negative correlation between SD knowledge and the outcome-expectancy beliefs of EfSD teaching. In other words, when SD knowledge decreases, the outcome-expectancy beliefs of pre-service ECE teachers increase (see Table 4.19).

Table 4.19

Multiple Regression Analysis regarding Prediction of Outcome Expectancy Beliefs of EfSD Teaching

Variables	B	β	t	*P*	partial	part
Personal EfSD Teaching Efficacy	.252	.226	4.328	.000*	.192	.182
SD Attitudes	.072	.115	2.188	.029*	.099	.092
SD Knowledge	-.244	-.135	-3.067	.002*	-.138	-.129
R=.369 R^2=.173 F= 25.530, $p<.05$						

On the other hand, the model indicated a small effect size (R^2=.173); with this said, however, it was found that personal teaching efficacy for EfSD, SD knowledge and SD attitudes were statistically significant predictors of outcome-expectancy beliefs regarding EfSD teaching.

CHAPTER 5

DISCUSSION

The final chapter of this study is broken down into three parts. First, the major findings of the study are summarised and compared with previous research. Second, the possible implications are provided in order to develop pre-service ECE teachers' self-efficacy beliefs with personal teaching efficacy and outcome-expectancy beliefs regarding EfSD teaching, SD attitudes, and SD knowledge. Finally, suggestions are provided for future studies.

5.1 Major Findings of the Study

5.1.1 Discussion of Descriptive Statistics

5.1.1.1 Pre-service ECE Teachers' EfSD Teaching Self-Efficacy Beliefs with Outcome-expectancy and Personal Teaching Efficacy Beliefs

According to the results, it can be concluded that pre-service ECE teachers have a moderate sense of general self-efficacy beliefs for EfSD teaching; indeed, this conclusion is based on the fact that the mean score was slightly above the median score (M=56.69). This means that pre-service ECE teachers moderately believe in themselves when it comes to teaching EfSD concepts to pre-school children, even if these children are difficult or lack motivation to learn (Guskey & Passaro, 1993). Similar to the current study's results, other studies found that pre-service teachers had moderate self-efficacy beliefs (Malandrakis et al., 2015; Schwarzer et al., 1997). Self-efficacy beliefs are about persevering in solving difficulties and daily problems and perceiving oneself as capable of finishing tasks successfully (Bandura, 1995; Luszczynska et al., 2005). Therefore, it may be concluded that since pre-service ECE teachers have moderate self-efficacy beliefs to teach EfSD,

they could potentially struggle with stressful events and also be successful at the end of tasks (Judge, Erez & Bono, 1998).

Richardson (2003) stated that the self-efficacy beliefs of teachers can be developed by "personal experiences", "experience with school and instruction" and "experience with formal knowledge". In the current study's context, this means that when pre-service ECE teachers experience EfSD in their personal life, experiences at school via lectures, and experiences providing EfSD knowledge, they can develop their self-efficacy beliefs and may have a higher sense of self-efficacy beliefs related to EfSD teaching. Compared to other studies, some research has shown that pre-service teachers have high self-efficacy beliefs regarding EfSD when they take an elective courses or unit related to SD or EfSD at their university (Demirci & Teksöz, 2017; Dyment et al., 2014; Evans et al., 2016). Considering the fact that 95.2% of pre-service ECE teachers did not take any course related to SD and 96% of pre-service ECE teachers did not take any course related to EfSD, the result is not surprising. Such a result may be attributed to the fact that most of the pre-service ECE teachers did not experience a SD or EfSD course at their universities which consisted of formal knowledge; indeed, one interesting study found that ECE teachers had higher self-efficacy levels for EfSD after taking Professional Development (PD) sessions (Dyment et al., 2014). Moreover, another research conducted by Evans et al. (2016) indicated an increase in the EfSD self-efficacy beliefs of pre-service primary, early childhood and middle school teachers after they were provided with sustainability pedagogies in the classroom. Moreover, upon examining the descriptive information in the current study, it seems that 73% of the pre-service ECE teachers were not members of a student club at their universities. Therefore, it may be said that there is also a lack of personal experiences with EfSD or SD issues, which may have prevented pre-service ECE teachers from developing their self-efficacy beliefs regarding EfSD teaching; indeed, this could have resulted in a moderate sense of self-efficacy beliefs for EfSD teaching.

In addition to having a moderate level of EfSD teaching self-efficacy beliefs, the personal EfSD teaching self-efficacy beliefs of the pre-service ECE teachers were also moderate, with a mean score of 30 and a median score of 31; indeed, the latter hardly differed from the mean score. Having favourable personal teaching efficacy beliefs is about a person's perception of self in completing certain tasks successfully (Bleicher, 2004). Thus, having moderate personal self-efficacy beliefs for teaching EfSD means that pre-service ECE teachers moderately believe in their ability to confidently and positively teach EfSD. This is also because personal self-efficacy beliefs contribute to teachers' self-conception and determine their future practices in educational settings (Richardson, 1996). Similar to this finding, other studies found that pre-service ECE teachers in science teaching (Olgan et al., 2014) and pre-service chemistry teachers in EfSD teaching (Stants, 2016) had moderate personal teaching efficacy beliefs. For instance, in the quantitative part of her study, Stants (2016) found that pre-service chemistry teachers displayed moderate personal self-efficacy beliefs of EfSD teaching and qualitatively explained that the pre-service chemistry teachers were not certain about their ability to teach EfSD. In the same context, since the pre-service ECE teachers in the current study harboured moderate personal EfSD teaching self-efficacy, it seems that they were not sure about teaching EfSD successfully, but had a positive attitude towards teaching it. In the current study, the pre-service ECE teachers' beliefs were not gauged qualitatively, which limited discussion along these lines. However, the idea that pre-service ECE teachers are not sure about whether they can teach EfSD successfully was supported by the responses they provided in the current research. When the responses of the pre-service ECE teachers are examined, the item with the lowest mean score (*M=3.08*) showed that 36% of the respondents were not sure about their ability to capture the young children's interest in sustainable development issues. Moreover, the item with the second lowest mean score (*M=3.22*) revealed that 37% of the pre-service ECE teachers were also not sure about how to explain the importance of SD to the children. In addition, according to the item with the highest mean score (*M=3.98*), these participants also believed that ECE teachers are responsible for teaching EfSD so that they increase the interest and knowledge of pre-school children. These results helped to infer that,

even though the respondents believed that ECE teachers are responsible for turning children's interest and knowledge of sustainable development topics, they did not know how to do that, due to a lack of daily and professional experiences or personal experiences.

Compared with other studies, certain works have reported that pre-service mathematics and science teachers had higher personal teaching efficacy in certain tasks after an intervention or after taking a course (Richardson, Liang & Wake, 2014; Savaşçı-Açıkalın, 2013). For instance, a study conducted by Savaşçı-Açıkalın (2013) explored pre-service science teachers' perceived science teaching efficacy in terms of whether it changed after a science laboratory course. Her results showed a significant difference between pre- and post-test results as the perceived science teaching efficacy of pre-service science teachers increased. Likewise, another study conducted by Effeney and Davis (2013) examined pre-service primary and ECE teachers' education for the sustainable teaching of self-efficacy and its association with their perceived and measured knowledge. The researchers found that the teachers' perceived self-efficacy for teaching sustainability was high, while this was also the case for perceived and measured knowledge level. They stated that this result could be attributed to an EfSD unit that they undertook during their teacher training, although it was not measured in the study. In light of this research, it could be said that since pre-service ECE teachers mostly did not take any course related to SD/EfSD, they did not reveal a higher level of personal EfSD teaching self-efficacy beliefs and were not sure about how to attract children's interest in EfSD; with this said, the teachers saw themselves as agents who are responsible for EfSD teaching and believe in their ability to successfully teach EfSD.

Similarly, the results indicated that pre-service ECE teachers hold moderate EfSD teaching outcome-expectancy beliefs; this conclusion is related to the fact that the mean score of outcome-expectancy beliefs was 25.92, and the median score was 26, slightly above the average. According to Bleicher (2004, p. 384), "the people are motivated to perform an action of they believe the action will have a favorable

result"; this notion is referred to as outcome-expectancy beliefs (Bleicher, 2004, p. 384). Therefore, it can be inferred that pre-service ECE teachers who have moderate outcome-expectancy beliefs believe that their EfSD teaching may lead to learning in young children. When considering this, the result could again be due to pre-service teachers' lack of experience with SD and EfSD issues in daily life and formal education settings. However; related literature has generally revealed that the outcome-expectancy beliefs of pre-service science, mathematics, and elementary teachers did not change, even after they took courses on science (Savaşçı-Açıkalın, 2013; Lakshmanan, Heath, Perlmutter & Elder, 2011), mathematics and science (Richardson & Liang, 2008), and EE (Moseley et al., 2010). Therefore, it may be said that this result did not emerge from lack of experience with EfSD-related issues. Besides this, there is also no literature supporting the notion that pre-service ECE teachers' EfSD teaching outcome-expectancy beliefs will remain stable after the intervention or related course. Thus, the results taken from previous studies may not always hold true. In terms of examining the pre-service ECE teachers' responses to the items, it was observed that the items with the second highest mean scores (M=3.90) both belonged to outcome-expectancy beliefs. The first item pertained to the pre-service ECE teachers' beliefs that their EfSD teaching would result in children's EfSD learning. Moreover, the second item, which had the same mean score, was "Improvement/progress in early childhood students' interest and knowledge in sustainable development is directly related to their teacher's effectiveness in sustainable development teaching". Similarly, the pre-service teachers again expressed that their effective teaching would lead to an increase in young children's interest in and knowledge of sustainable development. Moreover, and as emphasised earlier, the most selected item on the EfSD teaching self-efficacy scale revealed that pre-service ECE teachers saw themselves as being responsible for EfSD teaching. In this context, having moderate EfSD teaching outcome-expectancy beliefs may mean that pre-service ECE teachers who admit having a significant role in EfSD teaching also believe that it is vital for them to learn the EfSD concept. In addition, these pre-service ECE teachers may think that EfSD

teaching will result in EfSD learning in pre-school children; and for this purpose, they will probably teach SD-related issues better in ECE settings.

Additionally, when comparing the sub-scales, it is clear that the mean scores of the participants for personal EfSD teaching self-efficacy beliefs were higher (*M*=30) than the outcome-expectancy beliefs for EfSD teaching (*M*=25.92). This may mean that pre-service ECE teachers believe in their own ability to teach EfSD and perceive themselves as capable of teaching EfSD more so than expecting the desired outcomes of their EfSD teaching behaviour and learning acquired in children. However, this does not mean that pre-service ECE teachers do not believe that EfSD teaching is unnecessary and that their EfSD teaching does not endow the pre-school children with knowledge about EfSD. This result may be because of the fact that they did not experience EfSD practices in ECE settings as a teacher and do not have an idea about whether their EfSD teaching will result in EfSD learning in pre-school children.

5.1.1.2 Pre-service ECE Teachers' Attitudes towards Sustainable Development

In the current research, the pre-service ECE teachers were found to hold slightly high but moderate sense of attitudes towards SD, since the median score of 70 was above the mean score (*M*=68.87). Attitudes are hypothetical, dynamic and latent constructs; they are stimuli of behaviours, are developed and organised with experiences, and can sometimes be observed in accordance with the person's response which reflects upon the objects (Allport, 1935). Attitudes also illustrate people's favours and tendencies via their cognitive responses, affective responses, and conative responses (Allport, 1935). Considering all of this, since the pre-service ECE teachers were found to have positive attitudes towards SD in the current study, judging by their cognitive responses, it can be inferred that those pre-service ECE teachers have a chance to display environmentally- and sustainably-responsible behaviours in the future through their conative responses. As conative responses relate to a person's intentional behaviours, they are shaped in accordance with the attitude object and cognitive responses, which pertain to the thoughts of people

regarding objects or events (Ajzen, 2005). Moreover, it seems that the SD attitudes mean scores of the participants were not too high; indeed, the median score was almost 1.5 points above the midpoint. Allport (1935) stated that attitudes are enhanced according to experiences with the attitude object. Considering the fact that the majority of the pre-service ECE teachers had no experience with SD/EfSD related issues, nor did they take any elective courses or units at their universities, such a score can be considerable enough. Most of the studies which have explored SD attitudes reported that in-service and pre-service teachers had positive attitudes towards SD (Effeney & Davis, 2013; Michalos et al., 2010; Kahriman-Öztürk, 2016), as well as the environment (Tuncer et al., 2005; Pe'er et al., 2007). In their research, Effeney and Davis (2013) reported that pre-service primary and ECE teachers had positive attitudes towards SD with high scores; moreover, considering the context of the items exploring attitudes, they stated that the pre-service teachers agreed with the importance of sustainability.

Similarly, in the current research, pre-service ECE teachers revealed moderate and positive attitudes towards SD; therefore, it can be concluded that they believe SD is significant and necessary for society. Another study conducted by Öztürk (2016) examined the effect of SD attitudes on the EfSD practices of ECE teachers. The researcher found that pre-service ECE teachers had positive attitudes towards SD and towards their predictor and contributor roles in EfSD practices. Besides this, a study conducted with two datasets (children from grades 6-12 and adults) focused on their SD attitudes, SD knowledge and EfSD responsible behaviours (Michalos et al., 2010). The researchers observed that harbouring favourable attitudes towards SD had an influence on EfSD-related responsible behaviours. The researchers also stated the gender was the most influential factor in determining the attitudes towards SD. Considering these studies, it can be inferred that since pre-service ECE teachers in the current study showed positive attitudes towards SD, they have a chance to perform EfSD-related activities in their classrooms. Moreover, they may exhibit environmentally- and sustainably-responsible behaviours.

Among the limitations of this study is the fact that the sample consisted mostly of females. Therefore, the influence of gender could not be observed or discussed in the current study in terms of whether or not it had an effect on SD attitudes.

5.1.1.3 Pre-service ECE Teachers' Sustainable Development Knowledge

This study showed that the SD knowledge of pre-service ECE teachers was at a moderate level, with the median score of 10 slightly below the mean score (*M*=10.25). According to the item with the lowest mean score, 76.3% of the participants agreed with the idea that "SD implies; exploiting natural resources for human benefit while maintaining critical natural capital" (*M=1.29*). Furthermore, the item with the highest mean score (*M=1.70*) indicated that most of the participants chose the "agree" option for the item "SD implies; a significant degree of local production and consumption". These results show that most of the participants agreed with all items on the SD knowledge scale, since the majority chose the "agree" option. In addition, the pre-service ECE teachers mostly reported to help people to prevent starvation and disease, with a second highest mean score (*M=1.64*). Considering the items which had the highest mean scores, these items were observed to reflect the social side of SD, and this was mainly agreed upon by the participants. Indeed, it seems that pre-service ECE teachers give importance to the social aspect of SD. Moreover, considering the item with the lowest mean, this item seemed to refer to both the environmental and economic sides of SD; indeed, it was observed that 76.3% of pre-service teachers majorly agree with this item; this means that they give importance to both the environment and economy by using natural resources which do not damage the environment. The WCED (1987) described the SD as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (p. 43); indeed, the pre-service ECE teachers supported this definition by mostly choosing the "agree" option.

5.1.2 Pre-service ECE Teachers' EfSD Teaching Self-Efficacy Beliefs, SD Attitudes and Knowledge with respect to Auto-biographical Factors

5.1.2.1 Membership to Environmentally Active Student Clubs at University

According to the MANOVA results of this study, there was no statistically significant difference between club members and non-members on the combined dependent variables of EfSD teaching self-efficacy beliefs, SD attitudes and SD knowledge. Compared with other studies which explored how membership to environmentally active student clubs affect pre-service teachers' EfSD teaching self-efficacy beliefs, SD attitudes and SD knowledge, it was observed that there existed no study along the same lines. However, similar studies were explored, and it was found that these studies' findings were largely inconsistent with the relevant literature. One of the studies explored in-service ECE teachers' predictors of EfSD practices (Kahriman-Öztürk, 2016); it revealed that being a member of NGOs contributed to ECE teachers' EfSD practices in both eco and ordinary schools. In addition, another study conducted by Pe'er, Goldman and Yavetz (2007) indicated that pre-service teachers who were members of NGOs had a tendency to participate in SD-related issues. Moreover, Goldman (2006) stated that there was a positive relationship between environmentally responsible behaviours and being a member of NGOs for students. Comparing with previous studies, the difference found in the current study may be explained by the fact only a small sample of pre-service ECE teachers were members of student clubs which provides environmental organizations or activities such as tracking, climbing at their universities; as in the previous studies, the group sizes, including student club member and non-member students, were counterbalanced. Moreover, this contradiction with previous studies can also be explained by the variable. More specifically, in the current study, the pre-service ECE teachers were asked if they were members of environmentally active student clubs at their universities; however, the previous studies explored the participants' membership to NGOs. Therefore, it can be inferred that being a member of environmentally active student clubs and NGOs may provide different personal experiences to people and create varying results in terms of people's self-efficacy beliefs, attitudes, and knowledge.

5.1.2.2 Mostly-Lived Location during Childhood

With respect to the multivariate test results, there was no statistically significant difference between the pre-service teachers' mostly-lived location during childhood on the combined dependent variables of EfSD teaching self-efficacy beliefs, SD attitudes, and SD knowledge. When the related literature was compared, this result was found to contradict those of many studies conducted abroad and in Turkey; indeed, similar to the current study, one study found out the EfSD practices of ECE teachers did not differ according to childhood residence (Kahriman-Öztürk, 2016). Previous studies showed that ECE teachers who lived in a village had positive and higher attitudes towards SD than the teachers who lived in the city centre (Kahriman-Öztürk & Olgan, 2016). In addition, one of the studies (Tuncer et al., 2005) revealed that grade 6 students who lived in rural areas had positive and higher levels of environmental attitudes in contrast with students who lived in urban areas. Moreover, a study conducted with 5-year-old pre-school children revealed that the children living and receiving pre-school in a village had positive and favourable attitudes towards the environment, in contrast with the children living and receiving ECE in the city centre (Durkan et al., 2015). In short, the related literature proposed that living in a village during childhood brings out more interaction with nature and develops positive attitudes towards the environment. Therefore, although the result of the current study conflicts with the related literature, since interaction with nature develops multiple developmental domains within pre-school children (Kellert, 2005), they should be provided with outdoor learning environments.

5.1.2.3 Household type during Childhood

With respect to the multivariate test findings, in the current study, it was found that household type during childhood did not influence SD attitudes, SD knowledge and EfSD teaching self-efficacy beliefs. Compared to relevant literature, many studies supported the notion that household type may determine the natural experiences of children and such experiences develop positive attitudes towards the environment, environmentally-responsible behaviours, or political actions aimed at protecting the environment (Chawla, 1999; Hsu, 2009; Palmer, 1998; Tanner, 1980). For instance,

according to a study conducted by Hsu (2009) with adults, childhood residency, including the countryside lifestyle of adults, was the most effective significant life experience that contributed to their environmental behaviours and activist lifestyles. Similar to the current study, only one study found that mostly-lived location during childhood made no difference to the EfSD practices of ECE teachers (Kahriman-Öztürk, 2016). In this context, Palmer (1999), who studied different countries including the United Kingdom, Australia and Canada, stated that the sample size may change the results; indeed, this causes contradictions between the results of previous studies, because, in his study the sample sizes for each country were different. The researcher also stated that contradictions may also occur because of the differences among the countries in terms of their social, cultural and economic features; indeed, this is because, in his study, the findings were different among the countries. Considering these points, similar to Palmer's (1999) evaluation, the current study's results may contradict previous studies' results due to the sample size factor and the different social, cultural and economic features. Additionally, even though the results of the current study contradict those of previous studies, it can be concluded that children should be provided with natural experiences; indeed, this is because, as their age increases, their natural experiences decrease (Hsu, 2009).

5.1.2.4 Grade Levels

The results of this study also showed that there was a statistically significant difference between freshman, sophomore, junior and senior students' attitudes towards SD. More specifically, the senior (*M*=70.03) and freshman students (*M*=70.24) respectively had higher levels of SD attitudes than junior (*M*=66.96) and sophomore pre-service ECE teachers (*M*= 69.30). This means that pre-service ECE teachers who are new at a university, and also senior students who have almost graduated and are ready to teach pre-school children, hold positive attitudes towards SD; indeed, these people had higher mean scores compared to sophomore and junior pre-service ECE teachers.

Other studies also reported that senior students have the highest scores among other grade levels (Çabuk & Karacaoğlu, 2003; Gürbüz, Çakmak & Derman, 2013; Keleş, 2017). For example, one study revealed that the grade levels of pre-service teachers explained their attitudes towards sustainable environmental education; indeed, the author reported that sophomore, junior and senior students were different from freshman students (Keleş, 2017). Moreover, examining the mean differences between the grade levels, senior students were observed to have the highest attitudes score; moreover, junior students and sophomore students followed this (Keleş, 2017). In addition, a study conducted with pre-service teachers showed that environmental sensitivity was influenced by grade levels (Çabuk & Karacaoğlu, 2003). With respect to their study results, the researchers reported that senior and junior pre-service teachers had the highest mean scores respectively.

Surprisingly, although certain studies revealed that junior and senior students had higher attitudes towards SD, in the current study, it was inferred that junior students have the lowest mean score, while freshman students were found to have the second-highest mean score in terms of SD attitudes. Although this result is thought-provoking, there are other studies which have generated similar results to those of the current study (Aydın & Ünaldı, 2013; Yıldırım, Bacanak & Özsoy, 2012). For instance, a study conducted by Aydın and Ünaldı (2013) revealed that the attitudes towards a sustainable environment did not increase accordingly with the grade levels; this is because grade 1 students showed the highest mean score among other grade levels. Another study conducted by Yıldırım, Bacanak and Özsoy (2012) indicated that the senior and freshman pre-service teachers achieved higher scores in terms of their sensitivity to environmental problems respectively. These researchers also stated that having higher scores in environmental sensitiveness is a sign of positive attitudes towards environment, which is one of the components of SD (Keleş, 2017; Yıldırım et al., 2012).

To sum up, freshman and senior pre-service ECE teachers hold the highest mean scores in SD attitudes. This result may be attributed to the fact that freshman students come with higher expectations and attitudes when enrolling at the

university; and they have not yet been affected by teacher education. In addition, although the effect of elective courses on attitudes could not be analysed in the current research, it can be said that the SD attitudes of senior students may develop due to the courses they have taken during their teacher education period; indeed, one of the studies indicated that the teacher education period, including practicums and many courses, enhances pre-service teachers' attitudes towards science teaching (Keleş, 2017).

5.1.3 Predictor Roles of SD Knowledge, SD Attitudes and Personal EfSD Teaching Self-Efficacy Beliefs on EfSD Teaching Outcome-Expectancy Self-Efficacy Beliefs

According to the results, the model created to identify the roles of independent variables (SD knowledge, SD attitudes and personal EfSD teaching self-efficacy beliefs) significantly accounted for 17.3% of the variation of pre-service ECE teachers' outcome-expectancy beliefs of EfSD teaching. Furthermore, SD attitudes, SD knowledge and personal self-efficacy for teaching EfSD made a statistically significant and unique contribution to the equation. Examining the independent variables' contribution levels, total PTE values were found to have the strongest contribution in predicting pre-service ECE teachers' outcome-expectancy beliefs regarding EfSD teaching (β= .226). Respectively, SD knowledge (β= -.135) and SD attitudes (β= .115) made less of a contribution in predicting the outcome-expectancy beliefs of pre-service ECE teachers. However, the model indicated a small effect size (R^2=.173), even though personal EfSD teaching efficacy, SD knowledge and SD attitudes were found to be statistically significant predictors of outcome-expectancy beliefs regarding EfSD teaching.

When the results are examined in more detail, it can be seen that the contribution of SD attitudes, SD knowledge and personal EfSD teaching efficacy indicated that if pre-service ECE teachers have positive attitudes towards SD and believe in their capabilities to teach EfSD, they also believe in their ability to successfully teach EfSD; indeed, this may result in effective EfSD learning in young children. However, it seems that when their SD knowledge increases, the EfSD teaching

outcome-expectancy beliefs of pre-service ECE teachers decrease. In other words, the pre-service ECE teachers who have a positive and moderate sense of SD attitudes and moderately believe in their skills to teach children effectively in terms of EfSD, think that EfSD learning can be influenced by effective EfSD teaching (EfSD teaching outcome-expectancy beliefs). However, increases in SD knowledge negatively affect the beliefs of pre-service ECE teachers that effective EfSD teaching brings about EfSD learning in young children.

To begin with the contribution of SD attitudes and personal EfSD teaching efficacy, when the related literature was evaluated, one of the studies showed that pre-service ECE teachers' attitudes towards science teaching did not contribute to their outcome-expectancy beliefs of science teaching (Olgan et al., 2014). However, similar to the current study's results, the researchers reported that the personal teaching efficacy scores of pre-service ECE teachers made the strongest contribution to outcome-expectancy beliefs (Olgan et al., 2014). Although the researchers did not study EfSD teaching self-efficacy beliefs, their results indicated that personal teaching efficacy was the most effective predictor of outcome-expectancy beliefs. In addition, another study investigated pre-service classroom teachers' science teaching attitudes and outcome-expectancy efficacy beliefs regarding science teaching; it reported that the science teaching attitudes of pre-service classroom teachers were related to outcome-expectancy efficacy beliefs regarding science (Yıldız-Duban & Gökçakan, 2012). However; in contrast with the current study, the researchers reported a significant but small correlation between outcome-expectancy beliefs and attitudes regarding science teaching.

Following that, SD knowledge was found as a second predictor of outcome-expectancy beliefs of pre-service ECE teachers in the current study. As it was reported before, SD knowledge negatively associated with outcome-expectancy beliefs. That is, pre-service ECE teachers with moderate outcome-expectancy beliefs have less SD knowledge. When related the literature was explored, the studies provided information about how knowledge is effective in teaching (Appleton, 1995; Effeney & Davis, 2013). To exemplify, Appleton (1995), who

studied pre-service pre-school and primary teachers, reported that they had a small amount of science knowledge. Moreover, with respect to his interviews, the results also revealed that pre-service teachers believed a small amount of knowledge is enough to teach. This is because the pre-service primary and pre-school teachers in Appleton's research (1995) stated that the knowledge they acquired actually determined what they were able to teach to children but did not affect their self-confidence or self-efficacy beliefs in teaching. Moreover, the pre-service teachers stressed that strong sense of knowledge is not a prerequisite for teaching better and developing a strong sense of self-efficacy.

In addition to Appleton's study (1995), Effeney and Davis (2013) investigated SD knowledge's effect on education for the sustainability teaching efficacy of pre-service ECE and primary teachers; they found no relationship between SD knowledge and efficacy beliefs in sustainability teaching. Indeed, this means that SD knowledge did not determine the self-efficacy beliefs of participants with respect to sustainability teaching. In light of their study results, the researchers asserted that their findings could be attributed to an inaccurate measuring instrument, which basically failed to measure SD knowledge due to a "flaw in the survey design" (Effeney & Davis, p. 41). Therefore, they suggested that future research should either focus on this aspect of the measure in order to revise the design, or ignore the possibility of such a flaw. The researchers also emphasised that the knowledge may actually not be a prerequisite of teaching, since today's opportunities, enriched by information and commination technologies (ICT), can help teachers do not have higher levels of knowledge on many topics.

5.2 Educational Implications of The Study

In the current study, pre-service ECE teachers were found to have moderate self-efficacy beliefs which influenced the teachers' engagement in EfSD practices and effective teaching profession. Self-efficacy beliefs pertain to a person's confidence in themselves in terms of struggling with the difficulties in daily life (Bandura, 1995; Luszczynska et al., 2005). Hence, those pre-service ECE teachers who have moderate self-efficacy beliefs in teaching EfSD may struggle with stressful events

and also be successful at the end of tasks (Judge, Erez & Bono, 1998). The self-efficacy beliefs of pre-service teachers are hard to change if they are set before the pre-service teachers graduate (Bandura, 1997; Tschannen-Moran & Hoy, 1998). The self-efficacy beliefs were reported to increase performance and motivation in teaching (Gist & Michell, 1992) and affect student achievement (Moore & Esselman, 1992). Moreover, they were found to develop teacher identity (Beijaard et al., 2004), human agency (Bandura, 1995) and determine classroom behaviours (Pendergast et al., 2011). Kagan also reported (1992) that self-efficacy beliefs help teachers in filtering the new knowledge. Considering this, it can be inferred that moderate self-efficacy beliefs regarding EfSD teaching influence EfSD teaching practices, pre-service teachers' teaching performance, dealing with the challenges, and accordingly have an impact on children's EfSD learning and motivation for learning. Therefore, the EfSD teaching self-efficacy beliefs of pre-service ECE teachers should be developed during the teacher education period when they primarily develop self-efficacy beliefs (Hoy & Woolfolk, 1990; Mulholland & Wallace, 2001). It was stated that "the context and areas of content are important influences on the formation and judgements of teacher self-efficacy" (Pendergast et al., 2011, p. 47). Thus, in order to develop self-efficacy beliefs, cognitive processes, which are the sources of self-efficacy beliefs, may be preferred by providing social activities to the pre-service teachers at universities. Bandura (1997) emphasised the important roles of vicarious experiences, social persuasion, emotional states and, above all, mastery experiences in developing self-efficacy beliefs. Considering these, it may be that initiating the pre-service teachers for their mastery experiences in internships; giving feedback and encouraging them verbally in their EfSD practices by social persuasion, will improve the pre-service ECE teachers' self-efficacy beliefs in EfSD teaching. Moreover, so that the pre-service ECE teachers learn how to practice EfSD in ECE settings and show high performance in EfSD practices, there may be vicarious experiences via the good social role models succeeding in the EfSD tasks. In this way, the pre-service teachers believe in themselves to promote EfSD activities in their classrooms.

In the current study, pre-service ECE teachers' personal EfSD teaching beliefs were also found to be at a moderate level; and this result highlighted the importance of involving environmental education (EE), sustainable development (SD) and education in sustainable development (EfSD) courses. The relevant literature indicated that course experience in EE (Savaşçı-Açıkalın, 2013; Taylor et al., 2007) and EfSD (Effeney & Davis, 2013) contributed to the perceived self-efficacy beliefs of preservice teachers in teaching EfSD. In addition, according to Bandura (1981), teachers can develop their self-efficacy beliefs with practicum courses and by engaging with teaching in the field. It was reported that the personal teaching efficacy of pre-service teachers is affected by their mentor teachers' self-efficacy beliefs (Carter, 2006). Considering this, the mentor teachers with low personal EfSD teaching efficacy beliefs may decrease the personal EfSD teaching efficacy beliefs of intern students; indeed, this will cause pre-service ECE teachers to not believe in their skills in EfSD teaching. Thus, in-service training may be provided to the in-service teachers, and will serve as social models to the pre-service teachers. Moreover, there may be collaborative work between the mentors and universities, which could encourage the pre-service teachers to implement EfSD activities. While doing this, the mentors can observe and try to understand the pre-service teachers' sense of personal teaching efficacy towards EfSD teaching and may inform the universities about the pre-service teachers' engagements and failures in the classroom. As a result, teachers at universities may have a chance to revise their lectures, including EfSD practices accordingly.

In the current study, the EfSD teaching outcome-expectancy beliefs of pre-service ECE teachers were also found to be at a moderate level. Outcome-expectancy beliefs refer to whether "a given behaviour will or will not lead to a given outcome" (Maddux et al., 1982, p. 208); accordingly, the outcome-expectancy beliefs of pre-service teachers regarding teaching mean that believing in effective teaching will result in effective learning (Bleicher, 2004). The related literature revealed that the outcome-expectancy beliefs of pre-service science, mathematics, and elementary teachers did not significantly change after taking a course related to science (Savaşçı-Açıkalın, 2013; Lakshmanan et al., 2011), mathematics and science

(Richardson & Liang, 2008), and EE (Moseley et al., 2010). However, there was no study which supported this result about pre-service ECE teachers. Besides, it was found that the pre-service science and mathematics teachers' outcome-expectancy beliefs regarding EE immediately increased after the training and they were stable during their own EE practices in the classroom, since these were their first EE practices (Moseley, Reinke & Bookout, 2002). Given that the results showed pre-service ECE teachers to have outcome-expectancy beliefs of moderate level, it can be concluded that their outcome-expectancy beliefs regarding EfSD teaching should be developed to be higher. According to Maddux, Sherer and Rogers' experiment, conducted with university students from a psychology department (1982), the relationship between self-efficacy beliefs and outcome-expectancy was explored, as were the factors that improve outcome-expectancy beliefs. Their experiment results revealed verbal persuasion to be the most effective tool in manipulating a person's expectancies and accordingly behavioural intentions for the desired outcomes of the task. Therefore, it can be suggested that verbally initiating and persuading the pre-service ECE teachers to teach EfSD can develop their outcome-expectancy beliefs. Therefore, providing SD/EfSD and EE courses to pre-service ECE teachers, and verbally persuading them, can also develop their outcome-expectancy beliefs to teach EfSD; indeed, this may make them believe that their effective EfSD teaching will result in effective learning in pre-school children.

The study results also revealed that pre-service ECE teachers hold a moderate and positive sense of SD attitudes. Therefore, it can be said that the pre-service ECE teachers in the current study have a tendency to apply EfSD activities in ECE settings. The attitudes are latent constructs, as they cannot be observed but may be understood by non-verbal responses (Ajzen, 2005). In addition, attitudes show a person's favours to the attitude object. These attitudes were found to be associated with, and contribute to, the EfSD teaching outcome-expectancy beliefs of pre-service ECE teachers, similar to self-efficacy beliefs; as such, they also needed to be developed by SD-related practices or courses provided by teacher education programmes; this is because engagement with the attitude object stimulates the

desired behaviour (Ajzen, 2005). In order to improve pre-service teachers' attitudes towards SD, professional courses can be provided. In addition, the pre-service ECE teachers may be provided with vicarious experiences. To do this, the pre-service teachers may be encouraged to become members of eco-friendly organisations or there may be seminars, conferences or meetings which will acknowledge them in the same line. According to the results, the grade levels created a difference in SD attitudes as: senior students were observed to have the highest mean scores. However, as they were pre-service teachers who had almost graduated and were ready for teaching, it would be better to observe them with a higher level of SD attitudes. Therefore, it can be said that preparing pre-service ECE teachers for EfSD teaching is significant in terms of providing different periods of teacher training and should increase in accordance with the grade levels. By doing this, all grade levels hold higher attitudes towards SD and senior students would improve their attitudes towards SD and EfSD teaching self-efficacy beliefs in general.

The current research indicated that being a member of an environmentally active student club at university can be studied as a background variable. Results revealed that being a member of environmentally active student clubs at university did not make a difference to participants' EfSD teaching self-efficacy beliefs, SD attitudes and SD knowledge. However, especially being a member of NGOs was found to be effective in EfSD practices (Kahriman & Öztürk, 2016). Moreover, Goldman and Yavetz (2007) indicated that pre-service teachers who are members of NGOs have a tendency to participate in SD-related issues and display environmentally-responsible behaviours. Therefore, it can be proposed that this encourages pre-service teachers to participate in environmental organisations and NGOs working towards environmental and sustainable development issues. In this way, those pre-service teachers learn to be active sustainable and environmentally active citizens who would be role models for the pre-school children they will teach in the future.

Lastly, outcome-expectancy beliefs for EfSD teaching were found to have a significant but negative correlation with SD knowledge in the current research. This means that those pre-service ECE teachers who have limited SD knowledge still

believe that EfSD teaching will result in EfSD learning in pre-school children. Stants (2016) who explored SD knowledge and EfSD teaching self-efficacy beliefs of pre-service chemistry teachers, with respect to the quantitative part of her study results, reported that pre-service chemistry teachers hold a low level of SD knowledge and a moderate level of EfSD teaching self-efficacy beliefs. Moreover, considering the qualitative study results of her research, she concluded that those pre-service chemistry teachers still believe in themselves that their teaching will make a difference in their students' EfSD learning in the future. Besides, it is believed that pre-service teachers who are unfamiliar with SD understanding find the concept difficult to teach in classroom settings (Effeney & Davis, 2013; Evans et al., 2016; Stants, 2016). For instance, one study revealed that pre-service primary, early childhood and middle school teachers who were taught with sustainability pedagogies reported an increase in knowledge of what SD is, and which components it includes (Evans et al., 2016). Those pre-service teachers also revealed an increase in their self-efficacy beliefs to teach SD issues to children. In another study, it was reported that developing pre-service teachers' knowledge of the environment improved both their outcome-expectancy and personal teaching efficacy for teaching environmental education self-efficacy beliefs (Richardson, Bryne & Liang, 2016).

5.3 Limitations of the Study and Recommendations for Future Research

This study involved 541 pre-service ECE teachers at four of Ankara's biggest universities. In the same context, a nationwide study could be conducted to generalise the relationships between the correlated variables. For this purpose, it is recommended to further the study in different regions of Turkey with various social, cultural, and economic aspects.

This study was limited because of its method. The research questions tested in the current study yielded some results that would not have been uncovered by the other questions explored in the current study; indeed, some results raised other questions to be explained and discussed in detail. For example, SD attitudes, SD knowledge and EfSD teaching self-efficacy beliefs, along with its two dimensions were

explored in the current study. With this said, however, the participants' environmentally or sustainably responsible behaviours were not checked in terms of whether the pre-service ECE teachers with moderate EfSD teaching self-efficacy beliefs, SD attitudes and SD knowledge had any association with their environmentally- or sustainably-responsible behaviours. Therefore, it is suggested that future studies investigate these variables. Moreover, the current study was quantitative, which accordingly provided quantitative results with respect to overt responses of pre-service ECE teachers. Hence, focus group interviews could be carried out with pre-service ECE teachers who may also study at different universities. In addition, it could be effective to utilise some open-ended questions or a measure exploring the pre-service ECE teachers' perceived barriers to EfSD teaching. In that way, SD attitudes, EfSD teaching self-efficacy beliefs and SD knowledge might be explained with other significant factors.

Moreover, the current research did not focus on the sources of self-efficacy beliefs which were found to affect the self-efficacy beliefs of teachers and pre-service teachers (Bandura, 1997). Therefore, sources of self-efficacy beliefs can also be explored in terms of whether they contribute to EfSD teaching self-efficacy beliefs with respect to its two dimensions.

According to the research conducted by Pe'er et al. (2007), pre-service teachers do not always reflect their positive attitudes in their environmental practices. In the current research, while studying SD attitudes, the pre-service ECE teachers were not controlled in terms of whether they implement environmental or EfSD practices during practicum, or implement SD/ EfSD concepts while preparing activity plans. Thus, it is recommended that further studies explore whether or not the SD attitudes of pre-service ECE teachers turn into EfSD teaching behaviour, environmentally and sustainably behaviour, or effective teaching performance based on EfSD. Moreover, further studies could be conducted with in-service ECE teachers along the same lines, as this might make it easier to draw inferences in light of classroom observations.

Another limitation of the current study was the sample, which consisted mostly of pre-service ECE teachers who did not take any elective courses or units related to EE, SD and EfSD. Therefore, in future studies, pre-service ECE teachers could be provided with elective courses and be compared with those who did not take any courses or units related to EfSD, EE or SD.

Another limitation of this study was the lack of analyses influencing gender's effect on SD attitudes, SD knowledge and EfSD teaching self-efficacy beliefs. Because ECE is a gendered field and is willingly chosen by female students, there was not an appropriate number of males in the current study. Therefore, future research could explore gender's effect on SD attitudes, SD knowledge and EfSD teaching self-efficacy beliefs.

The majority of the pre-service ECE teachers in the current study were not members of student clubs which provide opportunities them to display environmental behaviours or outdoor experiences at their university, and were not asked if they were a member of NGOs or eco-friendly organisations. Therefore, as a significant life experience, future studies may investigate the effect of NGOs on pre-service teachers' SD attitudes, SD knowledge and EfSD teaching self-efficacy beliefs. Moreover, this study can be carried out with eco school and ordinary school ECE teachers in the field to find out if school type has an influence on those variables or not; indeed, this is because eco schools from ECE to the upper grades provide education programmes, including in-door and outdoor activities which aim to develop the attitudes, knowledge, behaviours and beliefs of teachers, students and all staff regarding SD (Bajd & Lescanec, 2011). Further studies may also focus on comparing ECE teachers who serve in eco schools and ordinary schools. In that way, their EfSD teaching self-efficacy beliefs, SD understanding, and their views or perceptions of the adequacy of SD knowledge could be investigated in detail by using qualitative research methods.

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APPENDICES

APPENDIX A: Demographic Information Form

Sevgili Öğretmen adayları,

Bu çalışma, okul öncesi öğretmen adaylarının sürdürülebilir kalkınmaya yönelik tutumları, bilgileri ve sürdürülebilir kalkınma öğretimine yönelik öz-yeterlik inançları arasındaki ilişkiyi belirlemeye yönelik bir araştırmadır. Sürdürülebilir kalkınma gelecek nesillerin ihtiyaçlarını göz ardı etmeden, doğal kaynakların verimli kullanılarak günümüz toplumunun ihtiyaçlarını karşılayabilecek kalkınma anlamına gelmektedir. Bu bağlamda, bir ülkenin ekonomik ve sosyal kalkınma politikaları hayata geçirilirken çevresel politikalar ile bütünleştirilmesi gerekmektedir. Ölçeklerde yer alan soruları içtenlikle doldurmanız, güvenilir sonuçlara ulaşmamızı sağlayacaktır. Sonuçlar sadece araştırmacılar tarafından bilimsel amaçlı kullanılacak ve üçüncü şahıslarla paylaşılmayacaktır. Lütfen tüm soruları eksiksiz cevaplamaya ve her bir soru için tek bir seçeneği işaretlemeye özen gösteriniz. Çalışmaya katılımınız için teşekkür ederiz.

Arş. Gör. Hasret KÖKLÜ
Aksaray Üniversitesi, Eğitim Fakültesi

Doç. Dr. Refika OLGAN
ODTÜ, Eğitim Fakültesi

1. Cinsiyetiniz: Erkek……. Kadın…….

2. Yaşınız: ….....

3. Devam etmekte olduğunuz Üniversite:
……

4. Sınıfınız: 1. Sınıf ……. 2. Sınıf ……. 3.Sınıf ……. 4.Sınıf…….

5. "Sürdürülebilir kalkınma (SK)" ile ilgili ders aldınız mı? Evet..... Hayır…...

Cevabınız evet ise kaç ders aldınız? ……..

6. "Sürdürülebilir kalkınma için eğitim (SKE)" ile ilgili ders aldınız mı?

Evet..... Hayır…….

Cevabınız evet ise kaç ders aldınız? ……..

7. Hayatınızı en uzun süre geçirdiğiniz yer?

☐ Köy/kasaba ☐ Şehir merkezi

8. Çocukken yaşadığınız konut tipi:

☐ Bahçeli ev ☐ Apartman dairesi

9. Herhangi bir öğrenci grubuna üye misiniz?

(Dağcılık, çevreyi koruma vb.)? Evet..... Hayır…….

APPENDIX B: Attitudes toward Sustainable Development Scale (ASD)

Aşağıda verilen ifadeler sürdürülebilir kalkınmaya yönelik tutumlarınızı belirlemeyi hedeflemektedir. Lütfen aşağıdaki ifadelere katılıp/katılmama derecenizi belirtiniz.	Kesinlikle katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle katılıyorum
1- Çevrenin korunması ve insanların yaşam kalitesi birbiriyle doğrudan bağlantılıdır/ilişkilidir.	1	2	3	4	5
2- Biyo-çeşitlilik, endüstriyel tarımın olumsuz etkilenmesi pahasına da olsa korunmalıdır.	1	2	3	4	5
3- Hükümetin ekonomi politikaları daha çok para harcamayı gerektirse bile, sürdürülebilir üretimi artırmaya yönelik olmalıdır	1	2	3	4	5
4-Gruplar arasındaki ekonomik farklılıkları azaltmak için insanlar daha fazla fedakârlık yapmalıdır.	1	2	3	4	5
5-Hükümetin ekonomi politikaları adil ticareti artırmaya yönelik olmalıdır.	1	2	3	4	5
6-Dünyada yoksulluk ve açlığı azaltmak, sanayileşmiş ülkelerin ekonomik refahını artırmaktan daha önemlidir.	1	2	3	4	5
7- Her bir ülke Dünya barışını korumak adına çok şey yapabilir.	1	2	3	4	5
8-Toplum, erkek ve kadınlara daha fazla eşit fırsatlar sunmalıdır.	1	2	3	4	5
9-Kültürler arası iletişim teşvik edici ve zenginleştiricidir.	1	2	3	4	5
10-Toplum, temel sağlık hizmetlerini ücretsiz sunmalıdır.	1	2	3	4	5
11-Toplum, bireylerin ve ailelerin refahı için sorumluluk almalıdır.	1	2	3	4	5
12-Üniversitedeki eğiticiler öğrenci merkezli öğretim yöntem ve tekniklerini kullanmalıdırlar.	1	2	3	4	5
13-Üniversitedeki eğiticiler tarihsel bilgiye ek olarak gelecek odaklı düşünmeyi de teşvik etmelidirler.	1	2	3	4	5

14-Üniversitedeki eğiticiler derslerde disiplinler arası bağlantı kurmayı teşvik etmelidir.	1	2	3	4	5
15-Üniversitedeki eğiticiler yerel ve küresel meseleler/sorunlar arasında bağlantı kurmayı teşvik etmelidir.	1	2	3	4	5
16-Üniversitedeki eğiticiler sürekli ders anlatmak yerine eleştirel düşünmeyi teşvik etmelidir.	1	2	3	4	5

APPENDIX C: Education for Sustainable Development Teaching Beliefs Scale (EfSD-B)

Aşağıdaki ifadeler sürdürülebilir kalkınma için eğitime (SKE) yönelik öğretmen öz-yeterlik inançlarını belirlemeyi amaçlamaktadır. Lütfen her bir soru için görüşlerinizi sağ tarafta yer alan beş farklı seçenekten birini işaretleyerek belirtiniz.	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
1.Eğer bir okul öncesi dönem çocuğu sürdürülebilir kalkınma konularına her zamankinden daha fazla ilgi gösteriyor ise, bunun nedeni çoğunlukla öğretmenin daha fazla çaba harcamasıdır.	1	2	3	4	5
2.Okul öncesi dönem çocuklarına sürdürülebilir kalkınma ile ilgili konuların öğretmek için sürekli daha iyi yöntemler bulabilirim.	1	2	3	4	5
3.Çok çaba harcasam da çocuklara sürdürülebilir kalkınma ile ilgili konuları diğer konu alanları (sanat, matematik, drama, fen, hareket vb.) kadar iyi öğretemeyeceğim. *	1	2	3	4	5
4.Okul öncesi dönem çocuklarının sürdürülebilir kalkınma ile ilgili konuları daha iyi öğrenmeleri genellikle öğretmenin daha etkili bir eğitim yöntemi kullanmasının sonucudur.	1	2	3	4	5
5. Sürdürülebilir kalkınma konuları ile ilgili etkinlikler yaparken çocuklara yeterince yardımcı olamayacağım. *	1	2	3	4	5
6. Okul öncesi dönem çocuklarının sürdürülebilir kalkınma konularına yönelik bilgilerinin ve ilgilerinin az olmasının nedeni büyük bir olasılıkla sürdürülebilir kalkınma ile ilgili uygulanan etkinliklerin yetersiz olmasıdır.	1	2	3	4	5

7. Sürdürülebilir kalkınma ile ilgili konuları genellikle etkili bir şekilde öğretemeyeceğim. *	1	2	3	4	5
8.Etkili bir eğitim süreciyle, çocukların sürdürülebilir kalkınma konularına yönelik bilgi eksikliklerinin üstesinden gelinebilir.	1	2	3	4	5
9.Okul öncesi dönem çocuklarının sürdürülebilir kalkınma konularına yönelik bilgilerinin artması genellikle öğretmenin konuyla ilgili daha fazla etkinlik uygulaması ile ilgilidir.	1	2	3	4	5
10.Okul öncesi dönem çocuklarının sürdürülebilir kalkınma konularına yönelik bilgi ve ilgilerinin arttırılmasında öğretmen büyük bir role sahiptir.	1	2	3	4	5
11.Okul öncesi dönem çocuklarının sürdürülebilir kalkınma konularına ilişkin bilgi ve ilgilerinin artması öğretmenin konuları etkili bir şekilde öğretmesi ile doğrudan ilişkilidir.	1	2	3	4	5
12.Eğer aile çocuğunun sürdürülebilir kalkınma ile ilgili konulara daha fazla ilgi gösterdiğini belirtiyorsa, bunun nedeni büyük olasılıkla öğretmenin performansıdır.	1	2	3	4	5
13.Okul öncesi dönem çocuklarına sürdürülebilir kalkınmanın neden önemli olduğunu açıklamada zorlanacağım. *	1	2	3	4	5
14.Okul öncesi dönem çocukların sürdürülebilir kalkınma konuları ile ilgili sorularını genellikle cevaplayabilirim.	1	2	3	4	5
15.Eğer seçme hakkım olursa, okul müdürünün veya müfettişlerin beni sürdürülebilir kalkınma konuları ile ilgili uygulamalar yaparken değerlendirmesini istemem. *	1	2	3	4	5
16.Sürdürülebilir kalkınma ile ilgili kavramları anlamada zorluk çeken	1	2	3	4	5

çocuklara genellikle nasıl yardımcı olacağımı bilemeyeceğim. *					
17.Okul öncesi dönem çocuklarının sürdürülebilir kalkınma ile ilgili konulara ilgisini çekmek için ne yapacağımı bilmiyorum. *	1	2	3	4	5

***** Yıldız ile belirtilen maddeler ters kodlanmıştır.

APPENDIX D: **Sustainable Development Knowledge Scale (SD-K)**

Aşağıda Sürdürülebilir Kalkınmayı (SK) açıklayan ifadeler verilmiştir. Size göre SK'nın kapsamı bu ifadelerden hangilerini içerir? Her bir tanım için "katılıyorum" "emin değilim" veya "katılmıyorum" şıklarından birini işaretleyiniz.	Katılıyorum	Emin Değilim	Katılmıyorum
1.SK "yaşanılan çevrede biyolojik çeşitliliğin sürdürülmesi" anlamına gelir.	①	②	③
2.SK "üretim sırasında oluşan zararlı atıkların etkilerinin azaltılması için yeni teknolojilerin geliştirilmesi" anlamına gelir.	①	②	③
3.SK "atık malzemelerin geri dönüştürülmesi" anlamına gelir.	①	②	③
4.SK "Doğal kaynakları insanlığın yararına kullanırken "canlı yaşamını destekleme kapasitesinin" devamlılığını sağlamak" anlamına gelir.	①	②	③
5.SK "doğanın ihtiyaçlarına insanlığınkinden daha fazla önem vermek" anlamına gelir.	①	②	③
6.SK "ekonomik büyümeyi yüksek ve istikrarlı şekilde sürdürmek" anlamına gelir.	①	②	③
7.SK "yerli malı üretim ve tüketiminin belirli bir düzeye ulaşması" anlamına gelir.	①	②	③
8.SK "açlık ve hastalığın önlenmesi amacıyla insanlara yardım edilmesi" anlamına gelir.	①	②	③
9.SK "herkesin ihtiyacının gözetildiği bir sosyal kalkınma" anlamına gelir.	①	②	③

APPENDIX E: Turkish Summary/Türkçe Özet

GİRİŞ

Günümüz nesli günden güne artmakta olan problemlerin olduğu bir dünyada yaşamaktadır (Hagglund & Samuelsson, 2009). Bu problemlerden bazıları çevreseldir; örneğin, küresel iklim değişikliği, enerji açığı ve karbondioksit emisyonu (Gwekwerere, 2014). Problemlerden bazıları ise sosyal ve ekonomik olmakla birlikte; bu problemler nüfusun hızla yükselmesi, eşit olmayan hayat koşulları, çocuk işçiliği, çocukların evliliği, kız çocuklarının eğitim haklarının engellenmesi ve iş koşullarının daha çok olduğu daha gelişmiş ülkelere veya şehirlere para kazanmak ve hayatta kalmak için göç edilmesi gibi sorunları kapsar (Gwekwerere, 2014). Araştırmacılara göre; çevresel, sosyal ve ekonomik problemler; insanların teknoloji, bilim ve sağlık hizmetlerini daha çok geliştirmek istemesinden dolayı doğa ile bilinçsiz etkileşiminden kaynaklanmaktadır (Dunlap & Jorgenson, 2012; UNESCO, 1997). Ayrıca, bu etkileşimin Dünya'nın doğal kapasitesi ve kaynaklarının gelecek nesiller için sorun teşkil edeceği de belirtilmektedir (Nevin, 2008; UNESCO, 2005).

Doğayı ve üzerinde bulunan tüm canlıların korunmasını sağlamak için, birçok gelişmiş devletin ve çevre-insan etkileşiminin doğa üzerindeki etkilerini çalışan birçok akademisyenin de katılımıyla Birleşmiş Milletler Eğitim Programı (BMEP) kurulmuştur (1972). Bunu takiben, Birleşmiş Milletler Eğitim, Bilim ve Kültür Örgütü (UNESCO) tarafından 1977 yılında Tbilisi Konferansı olarak da bilinen Uluslararası Çevre Eğitimi Konferansı gerçekleştirilmiştir. Konferans öncelikli olarak Çevre Eğitimi (ÇE) ve dünyanın geleceği için ÇE' nin gerekliliğine değinmiştir. Bu doğrultuda eğitimin, bireylerin çevresel problemler konusunda farkındalığını artırmaktaki ve çevreye zarar vermek yerine korumasını sağlamadaki rolü vurgulanmıştır (UNESCO, 1977). Bu organizasyonlara ek olarak; Dünya Çevre ve Kalkınma Komisyonu (WCED) tarafından oluşturulan Brundlandt raporunda, günümüzde hala akademik çalışmalarda gelişmekte, yayılmakta ve

tartışılmakta olan "Sürdürülebilir Kalkınma (SK)" (WCED, 1987) kavramından bahsedilmiştir.

Brundlandt raporunun sürdürülebilir kalkınma tanımına göre, sürdürülebilir kalkınma (SK) "bugünün gereksinimlerini gelecek nesillerin ihtiyaçlarını da karşılama yeteneğinden ödün vermeden karşılayan kalkınma" anlamına gelmektedir (WCED, 1987, s. 43). UNESCO'nun belirttiği tanıma göre ise SK; çevreye zarar vermeden doğal kaynakların kullanılması –çevre- (UNESCO, 2005), her bireye eşit yaşam koşullarının sağlanması –sosyal- (Reinfried, Schleicher & Rempfler, 2007; UNESCO, 2005) ve çevrenin sürdürülebilir olarak kalkındırılması –ekonomi- (Reinfried et al., 2007) boyutlarını kapsamaktadır. 1992 yılında Rio Earth Summit'te bir araya gelen birçok akademisyen, eğitim bakanı ve sivil toplum örgütü başkanlarının da görüşüyle birlikte, SK' nin getireceği ekonomik, sosyal ve çevresel kalkınmanın eğitim yoluyla kazanılabileceği belirtilmiştir (UNESCO, 1992). Söz konusu konferansta tutulan raporda ilk defa ele alınan "Sürdürülebilir Kalkınma için Eğitim (SKE)" "insanların ve toplumların en üst düzeyde potansiyellerine ulaşabilecekleri bir süreç olarak tanınmalıdır. Eğitim, sürdürülebilir kalkınmayı teşvik etmek ve halkın çevre ve kalkınma konularını anlama kapasitesini arttırmak için kritik önem taşımaktadır." (UNESCO, 1992, s.3). SKE ile birlikte, toplumun SK'nin ne anlama geldiği konusunda farkındalığı, sürdürülebilir kalkınmaya yönelik olumlu davranışlar sergilemesi ve ayrıca bu davranışlarla rol model olması sağlanacaktır (UNESCO, 1992). Araştırmacılara göre okul öncesi eğitimi dönemi bu amaçlara ulaşabilmek için sürdürülebilir kalkınma için eğitimin başlayabileceği en önemli basamaklardan biridir (Davis et al., 2008; Samuelsson, 2011; Arlealm, Hagser & Sandberg, 2011; Pramling Samuelsson & Kaga, 2008). Okul öncesi eğitiminde verilecek olan SKE ile birlikte, tüm çocukların her insanın benzersiz olduğunu fark edebilecekleri ve kendi görüşlerinden farklı görüşlere sahip insanlar da olduğunu öğrenebilecekleri gibi; toplumsal sorunları düşünme, tartışma, eleştirme ve çözüm üretme gibi becerileri kazandırılabilecektir (Samuelsson, 2011). Bu doğrultuda, çocuklara SKE' yi sınıf ortamında sağlayacak olan okul öncesi öğretmenlerinin SKE odaklı yetiştirilmesi önem kazanmaktadır. Araştırmacılara göre, SK için sınıf içi veya sınıf dışında

etkinlikler uygulayacak olan öğretmen adaylarının, öğretmen eğitimi sırasında gerekli bilgi, beceri, tutum ve yeterliklerinin kazandırılması gerekmektedir (Richardson, 1994, 1996). Richardson'a göre motive edici yapıları olan öğretmen öz-yeterlik inançları (Valcke et al., 2010), bilişsel ve duygusal yapıya sahip olan tutumları (Ajzen, 2005) ve ilgili oldukları alanla ilgili sahip olduğu bilgi düzeyi sınıf içi etkinlikleri ve uygulamaları etkilemektedir (1996). Bu nedenle mevcut araştırmada, sınıf içi SKE uygulamalarına da yön vereceği düşünülen okul öncesi öğretmen adaylarının SK'ye yönelik tutumları, SK'yi öğretmeye yönelik kişisel öz-yeterlik ve sonuç beklentisi inançları ve SK bilgi düzeyi incelenecektir.

Çalışmanın Önemi

Öğretmen, "sınıfın en pahalı ve önemli kaynağı" (Dean, 1993, s. 51) olarak "... öğrenme üzerinde olumlu ya da olumsuz bir fark yaratabilir. Eğer öğretim öğrenme üzerinde bir fark yaratmazsa, öğretmenlik mesleğinin sorunları var demektir" (Ornstein & Lasley, 2004, s.39). Bu noktada, öğretmen kalitesini belirleyen ve öğretmenlik mesleğini etkileyen öğretmen eğitimine, öğretimin etkili olabilmesi ve öğrenme üzerinde fark yaratabilmesi için gereken özen gösterilmelidir. Çünkü, öğretmen eğitiminin dolaylı olarak çocukların öğrenme ve başarısı üzerinde önemli etkisinin olduğu bulunmuştur (Hattie, 2003).

Öğretmen kalitesinin önemini açıklamak ve öğretmen eğitim programlarında yapılması gereken değişiklikleri önerebilmek amacıyla bazı araştırmacılar, öğretmen adaylarının öğretimde etkililiklerini belirleyen faktörleri incelemiştir. Yapılan çalışmalara göre, öz-yeterlik inançlarının öğretim performansı üzerinde önemli bir etkisinin olduğu bulunmuştur (Gibson & Dembo, 1986; Tschannen-Moran & Hoy, 2001; Woolfolk, 2004). Bandura' ya (1997) göre, güçlü öz-yeterlik inançları olan kişiler, karşı karşıya kaldıkları güçlüklerin çözümünde ısrar etmeye eğilimlidirler. Dahası, sorunları aşılabilir kabul ettikleri için, duygusal ve fiziksel olarak da sağlıklı hissederler. Benzer şekilde "Öğretmen öz yeterliği, öğretmenin etkililiğini şekillendiren önemli bir motivasyonel yapıdır" (Pendergast, Garvist & Keogh, 2011, s.46). Bu, öğretmenlerin yüksek öz-yeterlik inançlarına sahip

olmaları durumunda, sınıfta daha iyi öğretebilecekleri anlamına gelmektedir (Pendergast ve ark., 2011). Ayrıca, yüksek öz yeterlik inançları olan öğretmenler tüm öğrencilerin ihtiyaçlarını karşılamaya çalışırlar (Pendergast ve ark., 2011; Stants, 2015). Öte yandan, öğretmenlerin öz yeterlik düzeyi düşük olduğunda, kendilerini daha iyi öğretmeye zorlamazlar ve sınıftaki her çocuğa ulaşamazlar (Pendergast ve ark., 2011). Bu noktada, öğretmen adaylarının düşük öz-yeterlik inançları geliştirmesini mezun olmadan önce önlemek önem kazanmaktadır (Tschannen-Moran, Woolfolk Hoy & Hoy, 1998). Bu önlemi alabilmek için ise, öğretmenlerin öz-yeterlik inançlarını büyük oranda belirleyen öğretmen eğitimi sürecinde öz-yeterlik inançları incelenmeli ve geliştirilmelidir (Hoy & Woolfolk, 1990; Mulholland & Wallace, 2001).

Bu araştırma, hizmet öncesi okul öncesi öğretmenlerinin SKE öğretimine yönelik öz yeterlik inançlarını açıklayarak, öz-yeterlik inançlarının iki bileşeni olan sonuç beklentisi ve kişisel veya *algılanan öz-yeterlik* inançları üzerine ışık tutmaktadır (Bandura, 1997). Sonuç beklentisi inançları "bir bireyin belirli bir durum veya bağlamda belirli davranışların muhtemel sonuçları hakkında yaptığı kararlar" olarak nitelendirilirken (Wang ve diğerleri, 2017); kişisel öz-yeterlik inançları kişinin belirli görevleri başarıyla tamamlayabileceğine ve başarılı olacağına dair kendine inanması ile ilgilidir (Bleicher, 2004). İlgili literatüre göre, sonuç beklentisi inançlarının kişisel öz-yeterlilik inançları tarafından açıklandığı görülmüştür (Bandura, 1986; Olgan ve ark., 2014; Richardson, 1996). Kişisel öz yeterlik inançları, öğretmenlerin belirli bir görevi bitirme becerilerine olan inancını etkileyen faktörlerden biridir (Ashton ve Webb, 1982; Bandura, 1986; Richardson, 1994; Wang, Li & Tan, 2017). Bu bağlamda bu çalışmada, öğretmen adaylarının SK öğretimine yönelik kişisel öz yeterlik inançları; SKE' yi öğretmeye yönelik sonuç beklentisi inançlarını belirleyen faktörlerden biri olarak incelenecektir (Tschannen-Moran & Hoy, 2001). İlgili literatür dikkate alındığında, çevre eğitimi (ÇE) dersini almış olan öğretmen adaylarının ÇE' yi öğretmeye yönelik sonuç beklentisi inançlarının ve kişisel öz-yeterlik inançlarının arttığı görülmüştür (Moseley, Huss & Utley, 2010). Ek olarak, ÇE'yi öğretebileceğine dair düşük kişisel öz-yeterlik algısına sahip olan öğretmenlerin; ÇE'yi öğretmek için yüksek

sonuç beklentisi inançlarına da sahip olduğu bulunmuştur (Sia, 1992). Bu sonuca göre, öğretmen adayları ÇE' yi öğretmeye yönelik etkinlikler düzenleyebilme konusunda düşük kişisel öz-yeterlik inançlarına sahip olmasına rağmen, sınıf içinde ele aldığı etkinliklerin çocukların çevreye yönelik konuları öğrenmesini etkilediğine inanmaktadırlar (sonuç beklentisi) (Sia, 1992). Literatür ayrıca, kişisel öz-yeterlik inançlarının, hizmet öncesi okul öncesi öğretmenlerinin fen öğretimi sonuç beklentisi inançlarını (Olgan, Güner-Alpaslan & Öztekin, 2014) ve ÇE öğretimine yönelik sonuç beklentisi inançlarını etkilediğini ortaya koymuştur (Moseley ve ark., 2010). SK için öğretimin; sonuç beklentisi inançları ve kişisel öz-yeterliği aynı bağlamda değerlendirildiğinde, kişisel öz-yeterlik inançlarının hizmet öncesi okul öncesi öğretmenlerinin SK öğretim etkililiğini belirleyeceği beklenmektedir. Başka bir deyişle, SK öğretiminde önemli rolleri olduğuna inanan öğretmen adaylarının (sonuç beklentisi), SKE'yi öğretmeye yönelik performanslarını belirlediğine inanılmaktadır (kişisel öz-yeterlik). Bu nedenle, öğretmenlik etkinliklerini geliştirme potansiyeline sahipler ve muhtemelen sınıf içinde SK davranışlarını kazandırmayı amaçlayan etkinlikleri uygulamaktadırlar (Effeney & Davis, 2013). Bu nedenle, hizmet öncesi okul öncesi öğretmenlerinin SKE' yi öğretmeye yönelik kişisel öz-yeterliklerinin sonuç beklentisi inançları üzerindeki etkisini incelemek önemlidir. İlgili literatür incelendiğine, SKE' yi öğretmeye yönelik kişisel öz-yeterlik inançları ile SK' ya yönelik bilgi düzeyi arasındaki ilişkiyi araştıran bir çalışma bulunmaktadır (Stants, 2016). Bununla birlikte, SKE öğretimi bağlamında kişisel öz yeterlik ve sonuç beklentisi ile ilgili spesifik bir araştırma bulunmamaktadır. Bu nedenle, mevcut araştırma bu önemli ilişkiyi aydınlatacaktır.

Mevcut araştırmada okul öncesi öğretmen adaylarının sonuç beklentisi inançlarını etkileyen kişisel öz-yeterlik inançlarının incelenmesinin yanı sıra, SK' ye yönelik tutumlarının da belirlenmesi amaçlanmıştır. İlgili literatürde, birçok araştırmacı tutumların öğretmen adaylarının sonuç beklentisi inançları üzerinde belirleyici rol oynadığını bulmuşlardır (Chong ve ark., 2010; Tschannen-Moran & Hoy, 2006). Bu nedenle, mevcut araştırmada da SK tutumlarının, SKE öğretimine yönelik sonuç beklentisi inançları üzerinde etkisi olabileceği düşünülmektedir. Brennan ve Cotgrave'e (2013) göre SK/SKE' ye yönelik olumsuz tutumlar sürdürülebilirlik

uygulamalarını engellerken, olumlu tutumlara sahip olan öğretmen adaylarının SKE' ye yönelik sınıf içi uygulamalarının artmaktadır (Kahriman-Öztürk, 2016). Buna ek olarak, olumlu SK tutumlarının, sürdürülebilir kalkınmaya yönelik olumlu davranışlarla da ilişkili olduğu bulunmuştur (Michalos ve ark., 2012). Ayrıca, fen öğretimine (Demirel ve Akkoyunlu, 2010; Olgan ve diğerleri, 2014; Sarıkaya, 2008; Tekkaya, Çakıroğlu ve Özkan, 2002), bilgisayar destekli öğretime (Çetin & Güngör, 2012) ve matematik öğretimine yönelik olumlu tutumlara sahip öğretmen adaylarının (Akay & Boz, 2011; Ernest, 2006; Huinker & Madison, 1997) bu alanları öğretmeye yönelik öz-yeterlik inançları ile pozitif ve yüksek korelasyona sahip oldukları bulunmuştur. Bununla birlikte, ilgili literatür, SK' ye yönelik tutumlarının SKE öğretimine ilişkin sonuç beklentisi inançlarını yordayıp yordamadığını ortaya koyan herhangi bir çalışma içermemektedir. Bu nedenle, bu araştırma, bu önemli ilişkiyi incelemeyi amaçlamaktadır.

Bu çalışmada öğretmen adaylarının sonuç beklentisi inançlarını etkilediği düşünülen faktörlerden bir diğeri ise SK bilgisidir. UNESCO'nun Sürdürülebilir Kalkınma için On Yıllık Eğitim Planı'na göre öğretmen ve öğretmen adaylarının SK ile ilgili bilgi düzeyi, sürdürülebilir yaşam standartlarına ulaşma aşamasında önemli bir faktördür (2005). Bu yüzden, öncelikli olarak okul öncesi eğitimi öğretmenliği programlarında SK bilgi düzeyini artırmaya yönelik düzenlemeler yapılması gerektiği belirtilmiştir (UNESCO, 2005). Bu açıdan bakıldığında, hizmet öncesi öğretmen adaylarının yüksek öğrenim kurumlarındaki SK bilgilerinin geliştirilmesi önem kazanmaktadır. Öğretmen eğitimi sırasında SK ile ilgili verilecek olan eğitim sınıf içi etkinliklere yansıyarak, okul öncesi çocuklarının da SK ile ilgili konular hakkında farkındalık kazanması sağlanabilecektir (sonuç beklentisi) (Kahriman-Öztürk, 2016). Dolayısıyla, SK tutumlarının sonuç beklenti inançları üzerindeki öngörücü rolünü tanımlamanın yanı sıra, mevcut araştırma okul öncesi öğretmen adaylarının SK bilgisinin SKE öğretimine yönelik sonuç beklentisi inançlarına olası etkisini inceleyecektir. İlgili literatür dikkate alındığında, okul öncesi öğretmen adaylarının SK bilgi düzeylerinin SK' ye yönelik uygulama yapma sıklığı üzerindeki yordayıcı rolünün (Kahriman-Öztürk, 2016) ve hizmet öncesi okul öncesi ve sınıf öğretmenlerinin SK bilgisi ile SKE' yi öğretmeye

yönelik öz-yeterliği arasındaki olası ilişkinin incelendiği görülmüştür (Effeney & Davis, 2013). Ancak günümüz literatürü, SK' ye yönelik bilgi düzeyinin SKE öğretiminde öğretmen adaylarının sonuç beklentisi inançlarını etkileyip etkilemediğine dair çalışma içermemektedir. Dolayısıyla, mevcut araştırma bu önemli ilişkiyi aydınlatma potansiyeline de sahiptir.

Okul öncesi öğretmen adaylarının SKE' yi öğretmeye yönelik sonuç beklentisi inançlarını aydınlatmayı amaçlayan değişkenlere ek olarak, mevcut araştırma çocukluk döneminde şekillenmeye başlayan ve yetişkinliğe kadar da gelişmeye devam eden otobiyografik faktörlere de odaklanmıştır (Tanner, 1980). Birçok araştırmacı, otobiyografik faktörlerin, çevreye yönelik sorumlu davranışlar sergilemede, olumlu çevresel tutumlar geliştirmede, çevresel farkındalık ve hassasiyet kazanmada insanlar üzerinde bir etkisi olduğunu belirtmiştir (Chawla, 1998, Gough, 1999; Palmer, Suggate, Bajd, Hart ve al., 1998). Tanner (1980), en çok çocukluk döneminde yaşanan doğada gerçekleşen deneyimlerin; kişinin çevre ile ilgili konulardaki davranışlarını ve yaklaşımını etkilediğini bildirmiştir. Örneğin, bir kişinin çevreyle ilgili gelecekteki davranışları çocukluk döneminde köy veya şehir merkezinde yaşama, oturulan konut türü (apartman veya bahçeli evler), çevresel konularda faaliyet gösteren sivil toplum kuruluşlarına üyelik gibi faktörlerden etkilendiği belirtilmiştir (Chawla, 1998; Hsu, 2009; Lewis, 2007; Tanner, 1980). Otobiyografik faktörlerin ölçülmesine dayanan önceki çalışmalar genel olarak incelenmiş; çevresel duyarlılık (Hungerford ve ark., 1980), sorumlu çevresel davranışlar sergileme (Shinichi ve ark., 2007) ve çevresel eylemlere katılma (Hsu, 2009) gibi değişkenlerle arasında ilişki olduğu görülmüştür. Lise ve ilköğretim öğrencilerinin yanı sıra, otobiyografik faktörlerin, öğretmen adaylarının çevre tutumları üzerindeki etkilerinin ölçüldüğü görülmüştür (Andersen, 2004; Tuncer ve ark., 2004; Yılmaz, Boone & Andersen, 2004). Söz konusu faktörlerin okul öncesi öğretmenlerinin SK' ye yönelik sınıf içi etkinlikleri uygulama sıklığını belirleyip belirlemediğinin de çalışıldığı görülmüştür (Kahriman-Öztürk & Olgan, 2016). Son olarak, bu faktörler, okul öncesi çocuklarının çevresel tutumlarını ve farkındalığını açıklamak için araştırılmıştır (Cohen ve Wingerd, 1993; Durkan ve ark., 2015). Nitekim, bu çalışmaların tamamında, otobiyografik faktörlerin çevresel tutumlarla veya SKE'ye yönelik uygulama yapma sıklığıyla pozitif bir ilişkisinin

olduğu ve çevresel davranışların da belirleyicisi olabileceği sonucuna varılmıştır. Bu nedenle, otobiyografik faktörler mevcut araştırmada da SK tutumlarını, SK bilgi düzeyini ve SKE'yi öğretmeye yönelik öz-yeterlik inançları üzerinde etkisinin olup olmadığını belirlemek için araştırılmıştır.

Çalışmanın Amacı

Bu çalışma üç temel amaçla yürütülmüştür. Çalışma öncelikle okul öncesi öğretmen adaylarının SKE'yi öğretmeye yönelik öz-yeterlik inançlarını ve alt boyutları olan sonuç beklentisi inançları ile kişisel öz-yeterlik inançlarını da belirlemeyi amaçlamaktadır. Çalışmada ayrıca öğretmen adaylarının SK tutumları ile SK bilgisinin incelenmesi amaçlanmıştır. Bunların yanı sıra, çalışmada öğretmen adaylarının SKE' yi öğretmeye yönelik öz-yeterlik inançları, SK' ye yönelik tutumları ve SK bilgi düzeylerinin oto-biyografik değişkenlere göre farklılık gösterip göstermediğini belirlemek amaçlanmıştır. Son olarak, okul öncesi öğretmen adaylarının SKE' yi öğretmeye yönelik sonuç beklentisi inançlarının yordanmasında; SKE' yi öğretmeye yönelik kişisel öz-yeterlik inançlarının, SK tutumlarının ve SK bilgi düzeylerinin etkisinin olup olmadığını incelemek amaçlanmıştır.

Bu amaçlar doğrultusunda şu sorulara yanıt aranmıştır:

1. Okul öncesi öğretmen adaylarının SKE' yi öğretmeye yönelik öz-yeterlik inançları, SK' ye yönelik tutumları ve SK bilgileri ne düzeydedir?
2. Okul öncesi öğretmen adaylarının SKE' yi öğretmeye yönelik öz-yeterlik inançları, SK' ye yönelik tutumları ve SK bilgileri otobiyografik değişkenlere göre anlamlı bir değişime sebep olmakta mıdır?
3. Okul öncesi öğretmen adaylarının SKE' yi öğretmeye yönelik kişisel öz-yeterlik inançları, SK' ye yönelik tutumları, SK bilgi düzeyinin; SK' yi öğretmeye yönelik sonuç beklentisi inançlarına yordayıcı etkisi nedir?

YÖNTEM

Evren ve Örneklem

Araştırma evrenini, Ankara il merkezinde bulunan üç devlet üniversitesine ve bir özel üniversiteye devam eden 1, 2, 3 ve 4. sınıfa devam eden okul öncesi öğretmen adayları oluşturmaktadır. Katılımcılar kolay elverişli –uygun- örnekleme yolu ile seçilmiştir.

Araştırma Yöntemi

Araştırma, nicel araştırma yöntemlerinden biri olan tarama yöntemi ile yürütülmüştür. Bu yöntem, araştırma yapılmak istenen grubun karakteristik özelliklerini belirlemek için kullanılan bilgi toplama metodu olarak bilinmektedir (Fraenkel & Wallen, 2006).

Veri Toplama Araçları

Çalışmanın verileri Biasutti ve Frate (2016) tarafından geliştirilen ve Türkçe' ye uyarlaması araştırmacı tarafından yapılan *Sürdürülebilir Kalkınma için Tutum Ölçeği,* ve Stants (2016) tarafından geliştirilen ve Türkçe' ye uyarlaması araştırmacı tarafından yapılan *Sürdürülebilir Kalkınma için Eğitimi Öğretmeye Yönelik Öz-Yeterlik İnançları Ölçeği* ile toplanmıştır. Çalışmada veri toplama aracı olarak ayrıca Kahriman-Öztürk (2016) tarafından uyarlaması yapılan *Sürdürülebilir Kalkınma Bilgi Ölçeği* ile araştırmacı tarafından geliştirilen kişisel bilgi formu kullanılmıştır. Veri toplama araçlarından *Sürdürülebilir Kalkınma için Tutum Ölçeği* ve *Sürdürülebilir Kalkınma için Eğitimi Öğretmeye Yönelik Öz-Yeterlik İnançları Ölçeği'* nin Türkçe' ye uyarlanması sürecinde uzman görüşleri alınmış ve pilot çalışma yapılmıştır. Pilot çalışma sürecinde ölçeklerin geçerlik ve güvenirlikleri çeşitli istatistiksel analizlerle doğrulanmıştır. Yapılan analizler sonucunda, *Sürdürülebilir Kalkınma için Tutum Ölçeği'* nin tek faktörlü ve *Sürdürülebilir Kalkınma için Eğitimi Öğretmeye Yönelik Öz-Yeterlik İnançları*

Ölçeği' nin ise iki faktörlü yapıya sahip olduğu belirlenmiştir. Bunların yanı sıra, *Sürdürülebilir Kalkınma Ölçeği*' nin de tek faktörlü yapıya sahip olduğu doğrulanmıştır.

Veri Toplama Süreci

Mevcut çalışma verileri; Orta Doğu Teknik Üniversitesi Uygulamalı Etik Araştırma Merkezi'nden ve araştırmaya dahil edilen üniversitelerin rektörlüklerinden gerekli etik izinlerinin alınmasından sonra, 2016-2017 eğitim-öğretim yılının bahar yarıyılında toplanmıştır. Çalışmaya gönüllü olarak katılan okul öncesi öğretmen adaylarından verilerin toplanması yaklaşık 15 dakika sürmüştür.

Veri Analiz Süreci

Araştırmanın verileri nicel araştırma yöntemleri ile analiz edilmiştir. İlk araştırma sorusu için betimleyici analizler kullanılırken, ikinci ve üçüncü araştırma soruları için çıkarımsal istatistiksel analizlere başvurulmuştur.

BULGULAR

Araştırma sonuçlarına göre, okul öncesi öğretmen adaylarının ölçeklerden elde edilen ortalamaları doğrultusunda orta düzeyde (M=56.69) SKE öğretimine yönelik öz-yeterlik inançlarına sahip olduğu görülmüştür. Ayrıca, SKE öğretimine yönelik öz-yeterlik inançlarının alt boyutlarından olan sonuç beklentisi inançları (M=25.92) ile kişisel öz-yeterlik inançlarının (M=30) orta düzeyde olduğu saptanmıştır. Bunların yanı sıra, okul öncesi öğretmen adaylarının SK' ye yönelik tutumlarının olumlu ve orta düzeyde (M=68.87) olduğu görülmüştür. SK bilgilerinin ise (M=10.25) orta düzeyde olduğu bulunmuştur. Çok değişkenli varyans analizi (MANOVA) testi sonuçlarına göre, öğretmen adaylarının çocukluğunun büyük kısmında yaşadığı konut tipi –bahçeli ev, apartman- (p=.10), yaşadığı yer –şehir merkezi, köy- (p=.58) ve öğrenim görmekte olduğu üniversitede bulunan çevresel aktivitelere yer veren çevreci öğrenci topluluklarının/kulüplerine üye olup olmama

durumlarının (p=.04); SK tutumları, SK öğretimine yönelik öz-yeterlik inançları ve SK bilgileri üzerinde anlamlı bir fark yaratmadığı saptanmıştır. Ancak, öğretmen adaylarının öğrenim gördükleri mevcut sınıf düzeyinin SK tutumları üzerinde etkisinin olduğu belirlenmiştir (p=.00). Sonuçlara göre, sırasıyla dördüncü ve birinci sınıfta öğrenim görmekte olan öğretmen adaylarının SK tutumlarının ikinci ve üçüncü sınıf öğretmen adaylarından daha yüksek olduğu bulunmuştur. Ayrıca, çoklu regresyon analizi sonuçlarına göre, SK' yi öğretmeye yönelik kişisel öz-yeterlik inançları (β=.226, p=.00), SK bilgi düzeyi (β=-.135, p=.00) ve SK tutumlarının (β=.115, p=.02); SK öğretimine yönelik sonuç beklentisi inançları üzerinde anlamlı bir yordayıcı etkisinin olduğu belirlenmiştir.

TARTIŞMA

Eğitimsel Çıkarımlar ve Uygulamaya Yönelik Öneriler

Bu araştırmada öğretmen adaylarının orta düzeyde SK tutumlarına sahip olduğu görülmüştür. Sonuçlar doğrultusunda, orta düzeyde SK tutumlarına sahip olan okul öncesi öğretmen adaylarının SK'ye yönelik etkinlikle uygulamaya yatkın olduğu söylenebilir. Ayrıca, bu öğretmen adaylarının SKE öğretimiyle çocuklara kazandıracakları bilgi, beceri veya davranışların SK'ya yönelik olumlu sonuçlar doğacağına orta düzeyde inandığı da düşünülebilir. Bu doğrultuda, öğretmen adaylarının SK' ye yönelik tutumlarını iyileştirmek için mesleki kurslar sağlanabilir. Buna ek olarak, okul öncesi öğretmeni adaylarına sosyal tecrübeler kazanması için fırsat sağlanabilir. Bu amaçla, öğretmen adayları çevre dostu kuruluşlarına üye olmaları için teşvik edilebilir veya çevresel konular ile sürdürülebilirlik temalı seminer, konferanslar vb. organizasyonlara katılmaları önerilebilir.

Bunlara ek olarak, öğretmen adaylarının orta düzeyde SKE öğretimine yönelik öz-yeterlik inançları ile sonuç beklentisi inançları ve kişisel öz-yeterlik inançlarının da orta düzeyde olması, öğretmen adaylarının SK, ÇE veya SKE ile ilgili ders

almamasından dolayı olabilir. Ilgili literatür incelendiğinde öğretmen adaylarının öğretecekleri konularla ilgili almış oldukları derslerin, söz konusu alanı öğretmeye yönelik öz-yeterlik inançlarını (Effeney & Davis, 2013); sonuç beklentisi inançlarını (Moseley ve ark., 2010) ve kişisel öz-yeterlik inançlarını (Savaşçı Açıkalın, 2013) artırdığı görülmüştür. Bu nedenle, öğretmen adaylarına SKE öğretimine yönelik öz-yeterlik inançlarını sonuç beklentisi inançları ve kişisel öz-yeterlik inançları ile birlikte geliştirebilmesi için SK, ÇE veya SKE konularını ele alan seçmeli dersler sağlanabilir veya almış oldukları diğer derslere de entegre edilmesi önerilebilir. Öz-yeterlik inançları bireyin zorluklarla başa çıkma, sorunları aşılabilir görmesiyle ilgilidir (Kagan, 1992; Bandura, 1997). Orta düzeyde SKE öğretimine yönelik öz-yeterlik inançlarına sahip bulunan söz konusu öğretmen adaylarının, SKE' ye yönelik sınıf içi etkinlikler uygulayabileceğine, çıkabilecek sorunlarla baş edebileceğine ve göstereceği SKE öğretimi performansının başarılı olabileceğine orta düzeyde inandığı söylenebilir. Öğretmen adaylarının öz-yeterlik inançlarını öğretmen eğitimi sürecinde geliştiği ve geliştikten sonra değiştirilmesi zor olduğundan dolayı (Bandura, 1997; Tschannen-Moran & Hoy, 1998), bu süreçte öğretmen adaylarına öğretmeye yönelik öz-yeterlik inançlarını geliştirdiği incelenen sosyal aktiviteler sağlanabilir. Ayrıca, üçüncü ve dördüncü sınıfta staj uygulamalarına giden öğretmen adaylarına SKE uygulamaları yapmaları önerilerek, kavramı okul öncesi çocuklarına kazandırmayı amaçlayan etkinlikleri deneyim etmeleri sağlanabilir.

Mevcut araştırmada öğretmen adaylarının SKE öğretimine yönelik sonuç beklentisi inançlarının, SK bilgisi ile anlamlı ancak olumsuz bir korelasyona sahip olduğu bulunmuştur. Bu, SK bilgisi sınırlı olan hizmet öncesi okul öncesi öğretmenlerinin yine de SKE öğretiminin okul öncesi çocuklarda SK öğrenimine neden olacağına inandıkları anlamına gelmektedir. Kimya öğretmen adaylarının SK bilgilerini ve SKE öğretimine kişisel öz-yeterlik inançlarını ele alan Stants'in ele aldığı çalışmanın (2016), nicel kısmının sonuçlarına göre, hizmet öncesi kimya öğretmenlerinin düşük düzeyde SK bilgisinin ve orta düzeyde kişisel öz-yeterlik inançlarının olduğu bulunmuştur. Stants (2016), araştırmasının nitel kısmının sonuçlarını da dikkate alarak, öğretmen adaylarının gelecekte öğrencilerinin

SKE'yi öğrenmelerinde fark yaratacaklarına dair kendilerine inandıkları sonucuna varmıştır. Bu çalışmayla benzer sonuçların çıkmasında, öğretmen adaylarının SK ile ilgili ders almamış olmaları etkili olmuş olabilir. Nitekim SK ile ilgili düşük seviyede bilgiye sahip ve kavrama aşina olmayan öğretmen adaylarının konuyu sınıf içinde ele almanın zor olduğunu düşündükleri belirtilmiştir (Effeney & Davis, 2013; Evans et al., 2016; Stants, 2016).

Bunlara ek olarak, okul öncesi öğretmen adaylarının SK bilgisi, SKE öğretimine yönelik sonuç beklentisi inançlarının ikinci bir belirleyicisi olarak bulunmuştur. Daha önce de belirtildiği gibi mevcut çalışmada SK bilgisi, SKE öğretimine yönelik sonuç beklentisi inançlarıyla olumsuz ilişkilidir. Yani, orta düzeyde SKE öğretimine yönelik sonuç beklentisi inançlarına sahip öğretmen adaylarının SK bilgisi azdır. İlgili literatürde bilginin öğretme üzerindeki etkisini ele alan çalışmalara göre, öğreteceği konuyla ilgili az miktarda bilgisi olan öğretmen ve öğretmen adaylarının da konuyu öğretebileceklerine dair kendilerine inandıkları görüşmüştür (Appleton, 1995; Effeney & Davis, 2013). Örneğin, Appleton'un (1995) öğretmenlerle yaptığı bilginin öğretmelerindeki etkisini ele alan görüşmelerine ilişkin sonuçlar, öğretmenlerin öğretmek için az miktarda bilginin yeterli olduğuna inandıklarını ortaya koymuştur. Appleton' un yaptığı çalışmada, öğretmenler ayrıca öğretmenlerin yüksek düzeyde bilgi sahibi olmalarının, daha iyi öğretmenlik yapmak için ve daha güçlü öz-yeterlik inancı geliştirmek için ön koşul olmadığını vurgulamıştır. Bunun nedeni, öğretmen ve öğretmen adaylarının sahip olduğu bilgilerin aslında çocuklara öğretecekleri şeyleri belirleyebildikleri ancak öğretmedeki özgüveni veya öz-yeterlik inançlarını etkilememesi olabilir.

Çalışmanın Sınırlılıkları ve İleriki Çalışmalara Yönelik Öneriler

Bu çalışma, Ankara'nın dört büyük üniversitesinden 541 okul öncesi öğretmen adayının katılımı ile gerçekleştirilmiştir. Aynı bağlamda, çalışmada ele alınan değişkenler arasındaki ilişkileri genelleştirmek için ülke çapında bir araştırma yapılabilir. Bu amaçla, Türkiye'nin çeşitli bölgelerinde çeşitli sosyal, kültürel ve ekonomik yönleriyle çalışmaların yapılması önerilmektedir.

Bu çalışma yöntemi nedeniyle sınırlı yürütülmüştür. Mevcut çalışmada test edilen araştırma sorularının verdiği bazı sonuçlar, detaylı açıklanmasını gerektiren başka soruları da gündeme getirmiştir. Örneğin, mevcut çalışmada, SK tutumları, SK bilgisi ve SKE öğretimine yönelik öz-yeterlik inançları iki boyutuyla birlikte araştırılmıştır. Ancak, katılımcıların çevresel veya sürdürülebilirliğe yönelik davranışlarının mevcut araştırmada ele alınan değişkenlerle herhangi bir ilişkiye sahip olup olmadığı kontrol edilememiştir. Bu nedenle gelecekteki çalışmaların bu değişkenleri de araştırması önerilmektedir. Dahası, mevcut çalışma, nicel yöntemle yürütüldüğü için, öğretmen adaylarının anketlere verdiği cevaplar da nicel sonuçlar sağlamıştır. Bu nedenle gelecek araştırmalar, mevcut çalışmada ele alınan konuları üniversitelerinde SK/SKE ile ilgili ders almış ve almamış olan iki grupla olmak üzere odak grubu görüşmeleri ile derinlemesine tartışılarak sonuçlar karşılaştırabilir. Bunlara ek olarak, gelecek araştırmalarda yer verilecek açık uçlu bazı sorularla hizmet öncesi okul öncesi öğretmenlerinin SKE öğretimine yönelik algıladıkları bariyerleri araştıran bir çalışma yürütülebilir.

Mevcut çalışmanın bir başka kısıtlılığı da çalışma grubunun çoğunlukla çevre eğitimi (ÇE), SK ve SKE ile ilgili herhangi bir seçmeli almayan hizmet öncesi okul öncesi öğretmenlerinden oluşmasıdır. Bu nedenle, söz konusu dersleri alan ve alamayan öğretmen adayları arasında karşılaştırma yapılamamıştır. Gelecekteki çalışmalarda, öğretmen adayları arasında gerekli karşılaştırmaları yapabilmek ve bu derslerin etkisini ölçebilmek için belirtilen seçmeli dersler sağlanabilir.
Bu çalışmadaki öğretmen adaylarının büyük bir kısmının, üniversitelerinde çevresel etkinlikleri deneyimleme fırsatı sağlayan öğrenci kulüplerine üye olmadıkları bulunmuştur. Ayrıca, öğretmen adaylarına benzer faaliyetleri gösteren sivil toplum örgütleri veya çevre dostu diğer kuruluşlara üye olup olmadıkları sorulmamıştır. Bu nedenle gelecekteki çalışmalar, sivil toplum örgütlerinin de okul öncesi öğretmen adaylarının SK tutumları, SK bilgisi ve SKE öğretimine yönelik öz-yeterlik inançları üzerinde etkisinin olup olmadığını araştırabilir.

APPENDIX F: METU Ethics Committee Permission

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
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Sayı: 28620816 / 162

05 ARALIK 2016

Konu: Değerlendirme Sonucu

Gönderilen: Doç. Dr. Refika OLGAN
Eğitim Fakültesi

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Doç. Dr. Refika OLGAN;

Danışmanlığını yaptığınız yüksek lisans öğrencisi Hasret KÖKLÜ' nün "Okul Öncesi Öğretmen Adaylarının Sürdürülebilir Kalkınma Öğretimine Yönelik Öz-yeterlik İnançlarının Çeşitli Değişkenler ile İncelenmesi" başlıklı araştırması İnsan Araştırmaları Kurulu tarafından uygun görülerek gerekli onay **2016-EGT-162** protokol numarası ile **05.12.2016-30.07.2017** tarihleri arasında geçerli olmak üzere verilmiştir.

Bilgilerinize saygılarımla sunarım.

Prof. Dr. Canan SÜMER
İnsan Araştırmaları Etik Kurulu Başkanı

Prof. Dr. Mehmet UTKU
İAEK Üyesi

Prof. Dr. Ayhan SOL
İAEK Üyesi

Prof. Dr. Ayhan Gürbüz DEMİR
İAEK Üyesi

Doç. Dr. Yaşar KONDAKÇI
İAEK Üyesi

Yrd. Doç. Dr. Pınar KAYGAN
İAEK Üyesi

Yrd. Doç. Dr. Emre SELÇUK
İAEK Üyesi

APPENDIX G: Tez Fotokopisi İzin Formu

TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü	[ ]
Sosyal Bilimler Enstitüsü	[X]
Uygulamalı Matematik Enstitüsü	[ ]
Enformatik Enstitüsü	[ ]
Deniz Bilimleri Enstitüsü	[ ]

YAZARIN

Soyadı: KÖKLÜ
Adı : HASRET
Bölümü: Temel Eğitim Bölümü Okul Öncesi Eğitimi

TEZİN ADI: Investigating Early Childhood Teachers' Self-Efficacy Beliefs Regarding Education for Sustainable Development Teaching

TEZİN TÜRÜ: Yüksek Lisans [X] Doktora [ ]

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir.	[ ]
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir.	[ ]
3. Tezimden bir bir (1) yıl süreyle fotokopi alınamaz.	[x]

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: