



From Awareness to Attitude and Behavior? Relationships among Pre-Service Science Teachers' Awareness of Sustainable Development, Attitudes and Behaviors towards Environmental Issues¹

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ABSTRACT

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This research aims to explore relationships among science teacher candidates' awareness of sustainable development, attitudes and behaviors towards environmental problems. For this purpose, initially, pre-service science teachers' (PSTs) awareness of sustainable development, attitudes and behaviors towards environmental problems were determined. Then, the relationships among PSTs' awareness about sustainable development, attitudes and behaviors towards environmental problems were explored. In the present study, correlational research method was conducted. The sample of research were 712 pre-service science teachers from four different public universities in Istanbul, Türkiye. The data were collected with 3 different data collection tools which are 'Sustainable Development Awareness Scale', 'Environmental Problems Attitude Scale' and 'Environmental Problems Behavior Scale'. Descriptive statistics and Pearson correlation analysis were conducted in the data analysis. Findings showed that PSTs' awareness about sustainable development and attitudes towards environmental issues are high level while their behaviors towards environmental problems are medium level. Furthermore, both the relationship between PSTs' awareness of sustainable development and PSTs' attitudes against environmental problems and the relationship between PSTs' attitudes towards environmental issues and their behaviors towards environmental issues are positively directed medium level. In addition, the relationship between PSTs' awareness of sustainable development and PSTs' behaviors against environmental problems is positively directed low level. The results of current study can contribute significantly to generate new ideas about that which courses and practices about sustainable development and environmental issues can be placed in higher education or how sustainable development and environmental issues can be integrated with courses, and how educators can plan their lessons effectively.

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INTRODUCTION

Today, our world has been suffering from critical environmental challenges like global warming, climate change, different types of pollution (air, water, soil etc.), water shortages, loss of biodiversity etc. These challenges threaten the continuity of our world and mankind by causing harmful effects on not only some regions and countries but also whole world. One of the most crucial reasons why our world has faced these environmental challenges is mainly the human actions (DuNann-Winter & Koger, 2004; Gardner & Stern, 2008; Klanić et al., 2019; Shafiei & Maleksaeidi, 2020; Steg & Vlek, 2009; Vlek & Steg, 2007; Williams & Cary, 2002). Therefore, the change of human actions is vital for managing and solving environmental problems. The important points in the transformation of human actions are to understand underlying factors of human attitudes and behaviors toward environmental problems and how those can be changed or improved. Surely, answering these questions is extremely complex. Research done so far showed that human actions toward environmental problems are affected by many different factors like demographic, internal (e.g. pro-environmental knowledge, awareness, motivation, values, emotion, attitudes, and responsibilities) and external factors (e.g. economic, social, institutional and cultural) (Blok et al., 2015; Hines et al., 1987; Kollmuss & Agyeman, 2002; Li et al., 2019; Mainieri et al. 1997; Vicente-Molina et al., 2013). All this research helps us to understand many factors affecting human actions toward environmental issues. There can be many other factors which affect environmental attitudes and behaviors. Therefore, we tried to explore the effect of another variable which can be a factor for the change of human attitudes and behaviors towards environmental problems in the current research. Awareness of sustainable development can be another factor which affects human attitudes and behaviors towards environmental problems because some research emphasized that high awareness about sustainable development (based on 3 dimensions: environmental, economic and social) can encourage environmentally friendly attitudes and actions (Rajapaksa et al., 2018; Yusliza et al., 2020). Fien (2006) emphasized that individuals who have high awareness about sustainable development are more conscious about environmental problems, more sensitive toward environmental protection and effectively involved in achieving sustainable development at local, national and international level. Moreover, Çobanoğlu & Türer (2015) emphasized that if teachers have high sensitivity to the environment, they can help students gain knowledge and skills toward environmental and sustainability issues. Pre-service science teachers are future-trainers and role-models to cope with environmental problems and achieve sustainable development (Keleş, 2017). Pre-service teachers can play a key role in the way they teach and prepare their students for the future (García-González et al., 2020). They can train students about environmental issues and sustainable development through science courses and elective environmental education courses (Çobanoğlu & Türer, 2015). Therefore, in order to cope with environmental challenges in today's world and develop practical solutions for a sustainable world, pre-service science teachers, who are the shapers of future generations, should be well equipped. In this manner, it is aimed to explore the relationships among pre-service science teachers' (PSTs') awareness of sustainable development and their attitudes and behaviors towards environmental issues in the current research.

Research Background

Sustainable Development and Education

From past to present time, the different kinds of problems like environmental, economical and social have gradually been increasing in the world because of many reasons such as rapid population growth, urbanization, industrialization and toxic wastes etc. In our present time, in order to cope with these problems, achieving sustainable development with all aspects together is a common important goal of many countries all over the world. Sustainable development refers to “the development that meets the need of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development [WCED], 1987, p.43) and includes 3 different aspects (environmental, economical, social) (Strange & Bayley, 2008). Sustainable development involves the pursuit of a harmonious balance between these aspects that is, economic, environmental and societal imperatives (Ferguson et al., 2021). One of the most crucial steps for achieving sustainable development with all aspects both locally and globally is education

(Montebon, 2018; Nasibulina, 2015; UNESCO, 2013). However, sustainable development issues are not integrated enough into education systems (Bell, 2016; Biçer & Bulut, 2023; Dere & Demirci-Dölek, 2024; Tejedor et al., 2018). Developing a sustainable world requires not only the work of sustainable development experts but also the work of teachers and students whose efforts contribute to a more sustainable world (Moghadam et al., 2022).

Awareness of Sustainable Development

Teachers are critical agents in delivering the content and facilitating skills and action competencies to achieve sustainable development (Ferguson, Roofe & Cook, 2021). One of the policy action for the achievement of the sustainable development is to raise awareness of the sustainable development in higher education (Manolis & Manoli, 2021; Michael et al., 2020). Especially science and social studies teachers have key role to teach sustainable development issues at both science and social studies courses and elective courses like environmental education and climate change (Dere & Çinikaya, 2023; Fidan-Yazgan & Benzer, 2023). Therefore, pre-service teachers should have high awareness about sustainable development before they teach in classrooms as future professionals who can teach theoretical and practical knowledge necessary for achieving sustainable development. In the current literature, there are some researches about pre- and in-service teachers' awareness about sustainable development (Borg et al., 2014; Karpudewan et al., 2013; Khalid Malik et al., 2022; Labog, 2017; Nikel, 2007; Omisore et al., 2017; Omowunmi Sola & Michael, 2016; Öztürk-Demirbaş, 2011; Sunthonkanokpong & Murphy, 2019). All these studies showed that pre- or in-service teachers' awareness of sustainable development is high or adequate level.

Attitudes and Behaviors towards Environmental Issues

Environmental problems have been one of the major challenges facing humanity in today's world. Environmental problems can be defined as the processes that have negative effects on organisms and key elements needed for well-being of all livings such as air, water, soil as a result of human actions or mistreatments to environment (National Research Council [NRC], 1997; Pant et al., 2020). As understood from the definition, the most important reasons of environmental problems are people' attitudes and behaviors to environment. Environmental attitude refers to a set of feelings and values for the environment and the motivation for participating in environmental protection actively (United Nations Educational, Scientific and Cultural Organization [UNESCO], 1978). On the other hand, environmental behavior can be defined as consciously minimizing the negative impacts of actions on the environment like minimizing the usage of resources and reducing waste (Kollmuss & Agyeman, 2002). There is a need to increase positively environmental attitudes and behavior because environmental degradation is a general problem of humanity (Karpudewan & Ismail, 2012). Dobson (2007) emphasized that individuals, institutions and organizations should change their attitudes and behaviours to achieve sustainable development globally. As future educators of humanity, teacher candidates' level of attitudes and behaviors towards environmental problems are crucial because they have responsibility to raise individuals to deal with environmental problems and find solutions for them. Teachers' attitudes and actions can influence and shape learners' attitudes and actions. In the related literature, there are several studies about pre- and in-service teachers' attitudes toward environmental problems (Alpak-Tunç & Yenice, 2017; Arık & Yılmaz, 2017; Balcı, 2012; Kahyaoglu & Özgen, 2012; Koç & Kuvaç, 2016; Major et al., 2017; Mansaray et al., 1998; Özerkeskin et al., 2012; Polat & Kırpık, 2013; Sadık & Sadık, 2014; Sarıkaya & Saraç, 2018; Tuncer et al., 2017; Uyanık, 2017). Most of these research demonstrated that science teacher candidates' attitudes toward environmental problems are generally medium or high level. On the other hand, many studies addressing pre-and in-service teachers' behaviors toward environmental issues revealed pre-service science teachers' behaviors toward environmental problems are medium or low level (Alper, 2014; Hsu & Roth, 2006; Khalid Malik et al., 2022; Pe'er et al., 2007; Tan, 2014; Timur et al., 2014).

Relationships among Awareness-Attitude-Behavior

In the literature, there are a lot of researches about preconditions for environmental behaviors since the basic goal of environmental education is to enhance behavior and to improve active citizenship

(Heimlich & Ardoin, 2008; Hungerford & Volk, 1990; Short, 2009). Therefore, many studies addressing various aspects of environmental behavior were conducted (Amoah & Addoah, 2020; Carmi et al., 2015; Eilam & Trop, 2012; Grob, 1995; Hansla et al., 2008; Kil et al., 2014; Kollmuss & Agyeman, 2002; Levy et al., 2018; Liu et al., 2020; Vicente-Molina et al., 2013). All this research showed that there are many different factors like demographic, internal (e.g., pro-environmental knowledge, awareness, attitudes, emotion, responsibilities) and external factors (e.g. social, economic, and cultural) as preconditions for environmental behavior (Ajzen, 1991; Kollmuss & Agyeman, 2002; Mainieri et al., 1997; Redondo & Puelles, 2016; Stern, 2000; Schultz, 2002; Vicente-Molina et al., 2013). According to research in related literature, it is obvious that there is a correlation among environmental awareness, environmental attitudes and environmental behaviours (Horvat & Smrekar, 2017; Kollmuss & Agyeman, 2002). However, the important points are the degree and direction of these correlations in terms of developing environmental behavior. Research showed that awareness can be an important determinant for environmental attitudes and environmental attitudes can be crucial determinant for environmental behavior (Gifford & Sussman, 2012; Marcinkowski & Reid, 2019; Newhouse, 1991). On the other hand, awareness may not be a direct condition for environmental behavior although there are relationships between each other. That is, even if individuals' awareness or knowledge is high level, they can remain rather indifferent to environmental behavior (Eom, 2019; Kaiser & Fuhrer, 2003; Moody-Marshall, 2022; Wi & Chang, 2018; Yılmaz & Can, 2020). In other words, enhanced environmental or sustainable development awareness generally can lead to positive environmental attitudes but it may not be enough to create environmental behavior. Therefore, the current research aims to explore whether pre-service science teachers' (PSTs') awareness about sustainable development is related with their attitudes and behaviors towards environmental issues. The research questions of this study are as follows:

- What are the levels of PSTs' awareness about sustainable development, attitudes and behaviors towards environmental issues?
- Are there significant relationships among PSTs' awareness about sustainable development, attitudes and behaviors towards environmental issues?

METHOD

Research design

This research was conducted with the design of correlational research. The correlational model is the quantitative research method revealing the relationships between two or more variables without manipulation of an independent variable (Büyüköztürk et al., 2016; Cohen et al., 2007). According to Fraenkel and Wallen (2006), correlational research can be seen one kind of descriptive research because it reveals existing relationships between variables. Correlational research also provides the direction and degree of relationships among variables (Fraenkel & Wallen, 2006). Therefore, the relationships among PSTs' awareness of sustainable development and attitudes and behaviors towards environmental problems were explored in the current study.

Research Sample

The sample of study is 712 (625 female and 87 male) pre-service teachers who were all grade level students (1., 2., 3. and 4.) from the department of science education at four different public universities in Istanbul, Türkiye. In this study, the sample was chosen as pre-service science teachers because they are future-trainers and role-models to cope with environmental problems and achieve sustainable development. All PSTs participated in this study voluntarily.

Data Collection

The data were collected with 3 different data collection tools. 'Sustainable Development Awareness Scale' developed by Öztürk-Demirbaş (2011), 'Environmental Problems Attitude Scale' developed by Güven (2013) and 'Environmental Problems Behaviour Scale' developed by Güven & Aydoğdu (2012)

were conducted to science teacher candidates in this research. Before the data collection process, the aim of the research was explained to PSTs, and they participated in the study voluntarily. There is detailed information about data collection tools below.

Sustainable Development Awareness Scale

'Sustainable Development Awareness Scale' developed by Öztürk-Demirbaş (2011) consists of 3 sub-dimensions (environmental-moral, communal-social and environmental-economic) and 30 items. In this scale, there are 14 items about environmental-moral subdimension, 9 items about communal-social subdimension and 7 items about environmental-economic subdimension. This scale is 5-point likert-type, and it was scaled like '1- disagree at all', '2-disagree', '3-undecided', '4-agree', '5-totally agree' for each item by developer. The Cronbach's-alpha coefficient was found 0,849 by developer. In the current research, the Cronbach's-alpha coefficient was calculated as 0,862. Because items' number in sub-dimensions are different from each other, scores obtained from items are not standard. Therefore, developer and researchers used the formula below for the purpose of standardization of obtained scores at scale.

$$X_{standard\ score} = \frac{X_{raw\ score}}{Items\ number\ at\ scale} \times 20$$

In this way, pre-service science teachers can get 20 points at least while they can get 100 points at most from this scale. According to obtained scores, if obtained scores between 20 and 46, awareness level is low, if obtained scores between 47 and 72, awareness level is medium and if obtained scores between 72 and 100, awareness level is high.

Environmental Problems Attitude Scale

'Environmental Problems Attitude Scale' was developed by Güven (2013) by following affective domain steps of Bloom's taxonomy (i.e. receiving, responding, valuing, organizing and characterizing). The scale consists of 45 items and 5 factors and is based on the reasons of environmental problems, local and global environmental problems, and preventing environmental problems. In addition, the scale is 3-point likert-type, and it was scaled like '2-agree', '1-undecided', '0-disagree' for each item by developer. The aim of developing this scale was to examine pre-service teachers' fears, uneasiness, anxiousness and sadness arising from environmental problems, and their value judgments and readiness level about environmental problems (Güven, 2013). The Cronbach's-alpha coefficient was found 0,88 by developer. In the current research, the Cronbach's-alpha was calculated as 0,832. Pre-service teachers can get 0 point at least while they can get 90 points at most from this scale. According to obtained scores, if obtained scores between 0 and 45, awareness level is low, if obtained scores between 45 and 72, awareness level is medium and if obtained scores between 72 and 90, awareness level is high.

Environmental Problems Behaviour Scale

'Environmental Problems Behaviour Scale' was developed by Güven & Aydoğdu (2012) by considering psychomotor domain steps of Bloom's taxonomy (i.e. perception, set, guided response, mechanism, complex overt response, adaptation and origination). The scale consists of 40 items and 6 factors and is based on reasons of environmental problems, local and global environmental problems, and preventing environmental problems. Moreover, the scale is 3-point likert-type, and it was scaled like '2-agree', '1-undecided', '0-disagree' for each item by developers. The aim of developing this scale was to determine pre-service teachers' behaviors and efforts to prevent environmental problems and their readiness level about environmental problems (Güven & Aydoğdu, 2012). The Cronbach's-alpha coefficient was found 0,85 by developers. In the current research, the Cronbach's-alpha reliability coefficient was calculated and found as 0,829. Pre-service teachers can get 0 point at least while they get can 80 points at most from this scale. According to obtained scores, if obtained scores between 0 and 40, behavior level is low, if obtained scores between 40 and 60, behavior level is medium and if obtained scores between 60 and 80, behavior level is high.

Data Analysis

In the data analysis, SPSS was used to assess PSTs' awareness of sustainable development, attitudes and behaviors towards environmental issues and the relationships among awareness about sustainable development, attitudes and behaviors against environmental issues. Firstly, PSTs' total awareness scores about sustainable development and scores for each subdimension (environmental-moral, communal-social and environmental-economic) calculated with descriptive statistics. Similarly, PSTs' scores about attitudes and behaviors toward environmental problems were calculated with descriptive statistics. Then, by using descriptive statistics, the mean, minimum and maximum scores of 712 PSTs' awareness about sustainable development and its subdimensions (environmental-moral, communal-social and environmental-economic), and their attitudes and behaviors toward environmental problems were calculated. In this way, PSTs' general awareness about sustainable development, attitudes and behaviors levels towards environmental problems were revealed. In order to investigate the relationships among PSTs' awareness of sustainable development and PSTs' attitudes and behaviors towards environmental problems, Pearson correlation analysis from parametric statistical methods were conducted since the data were distributed normally (Büyüköztürk, 2016; Pallant, 2007).

Ethic

The current study was conducted in accordance with the approval by the ethics committee of Akdeniz University (protocol code 55578142).

FINDINGS

In this study, PSTs' awareness about sustainable development, attitudes and behaviors towards environmental problems were determined. In addition, the relationships among PSTs' awareness about sustainable development, attitudes and behaviors towards environmental problems were explored. The results are presented under separate headings at below.

PSTs' Awareness of Sustainable Development

According to the findings, PSTs have high awareness of sustainable development ($M=85,58$) (Table 1). When PSTs' awareness about sustainable development was examined in terms of subdimensions of sustainable development, it was seen that their awareness about environmental-moral ($M=91,16$) and communal-social ($M=88,00$) subdimensions were high level, but their awareness about environmental-economic ($M=71,31$) subdimension was medium level. Moreover, findings demonstrated that PSTs have the highest awareness about environmental-moral dimension of sustainable development.

Table 1. Descriptive statistics results related to PSTs' awareness of sustainable development

	N	Mean	SD	Min.	Max.
Awareness of Sustainable Development	712	85,58	7,33	68,00	100,00
Environmental-Moral	712	91,16	7,03	68,57	100,00
Communal- Social	712	88,00	8,90	57,78	100,00
Environmental-Economic	712	71,31	17,59	20,00	100,00

PSTs' Attitudes and Behaviors toward Environmental Problems

Findings showed that pre-service science teachers' scores about attitudes towards environmental problems were high level ($M = 73,47$) while their scores about behaviours towards environmental problems were medium level ($M = 56,67$) (Table 2).

Table 2. Descriptive statistics results related to PSTs' attitudes and behaviors toward environmental problems

	N	Mean	SD	Min.	Max.
Attitudes toward Environmental Problems	712	73,47	8,72	45,00	89,00
Behaviors toward Environmental Problems	712	56,67	9,48	30,00	78,00

Relationships among PSTs' Awareness of Sustainable Development, and Attitudes and Behaviors toward Environmental Problems

Table 3 demonstrates the Pearson correlation results about relationships among PSTs' awareness of sustainable development, and their attitudes and behaviors toward environmental problems. According to the findings, there is a positive relationship between PSTs' awareness about sustainable development and attitudes toward environmental problems in medium level ($r=0,458$, $p<.01$). Similarly, results indicated that there is a positive relationship between PSTs' attitudes and behaviours towards environmental problems in medium level ($r=0,626$, $p<.01$). On the other side, the results demonstrated that there is a positive relationship between PSTs' awareness about sustainable development and behaviours towards environmental problems in low level ($r=0,294$, $p<.01$).

Table 3. Pearson correlation test results related to relationships between PSTs' awareness of sustainable development, and attitudes and behaviors toward environmental problems

		Awareness of Sustainable Development	Attitude towards Environmental Problems	Behaviors towards Environmental Problems
Awareness of Sustainable Development	Pearson Correlation	1	,458**	,294**
	p (2-tailed)		,000	,000
	N	712	712	712
Attitudes towards Environmental Problems	Pearson Correlation	,458**	1	,626**
	p (2-tailed)	,000		,000
	N	712	712	712
Behaviors towards Environmental Problems	Pearson Correlation	,294**	,626**	1
	p (2-tailed)	,000	,000	
	N	712	712	712

DISCUSSION & CONCLUSION

Discussion

In the current research, PSTs' awareness of sustainable development, attitudes and behaviors against environmental issues were determined. Then, the relationships among PSTs' awareness of sustainable development, attitudes and behaviors towards environmental issues were explored. Results showed that PSTs' awareness of sustainable development is high level. Omowunmi Sola and Michael (2016) also revealed that university students have high awareness about sustainable development in their study. In addition, PSTs' awareness was examined in each sub-dimension of sustainable development which are environmental-moral, communal-social and environmental-economic. Their awareness about environmental-moral and communal-social subdimensions are high level but their awareness about environmental-economic is medium level. Research conducted with science teacher candidates in different fields supports the current research. Although pre-service teachers have high awareness about environmental and social sub-dimensions of sustainable development, their awareness about economic sub-dimension of sustainable development was not sufficient

level (Borg et al., 2014; Öztürk-Demirbaş, 2011; Türer, 2010). This result revealed that it should be taken in consideration and emphasized to the objectives about economic subdimension in education for sustainable development (ESD). Furthermore, in education programs for sustainable development, each subdimension of sustainable development should be equally emphasized in order that science teacher candidates can have a holistic approach about sustainable development.

The current study also showed that scores of science teachers candidates' attitudes toward environmental problems are high level. Many studies conducted previously revealed similar conclusions (Alpak-Tunç & Yenice, 2017; Balcı, 2012; Borhan & Ismail, 2011; Öz-Aydın et al., 2013; Sarıkaya & Saraç, 2018). On the other hand, scores of science teacher candidates' behaviors towards environmental problems are medium level. Alper (2014) and Güven & Aydoğdu (2012) also revealed in their study that PSTs' environmentally friendly behaviors are medium level. In another study, Sadık and Sadık (2014) found that PSTs' behaviors toward environmental problems were low level.

The most important finding of the current research is that the relationships among PSTs' awareness of sustainable development, attitudes and behaviors towards environmental problems. According to the results, the relationship between PSTs' awareness of sustainable development and their attitudes toward environmental problems is positively directed medium level. Similarly, there is a positive medium level relationship between PSTs' attitudes and behaviors toward environmental problems. However, the relationship between PSTs' awareness of sustainable development and their behaviors towards environmental problems is low level in positive direction. Pe'er, Goldman & Yavetz (2007) also revealed in their research that there is a low relationship between pre-service teachers' environmental knowledge (awareness) and environmental behaviors. Shafiei and Maleksaeidi (2020) and Zeng, Zhong, and Naz (2023) demonstrated in their research that environmental attitude is the direct determinant of environmental behavior and impacts it positively. Similarly, Liu, Teng & Han (2020) showed that environmental knowledge (awareness) has an important positive effect on environmental attitudes and environmental attitudes have a considerable positive effect on environmental behavioral intentions and environmental behaviors. On the other hand, awareness may not be a direct condition for environmental behavior although there are relationships between each other. That is, even if individuals' awareness or knowledge is high level, they can remain rather indifferent to environmental behavior (Eom, 2019; Kaiser & Fuhrer, 2003; Liu et al., 2020; Moody-Marshall, 2022; Wi & Chang, 2018; Yılmaz & Can, 2020). From these results, it can be inferred that although pre-service teachers have high awareness about sustainable development and positive attitudes towards environmental problems, they may not take an action as an environmentally friendly. This means that high awareness and positive attitude are not only determinants to create and develop positive behaviors towards the environment. There can be many other factors affecting environmental behaviors like demographic factors, external factors and internal factors (Hwang et al., 2000; Kollmuss & Agyeman, 2002; Vicente-Molina et al., 2013). Therefore, developing environmental behavior is a complex process and cannot be explained with a one framework or diagram (Hwang et al., 2000; Kollmuss & Agyeman, 2002; Liu et al., 2020).

Conclusions

The current research presented significant data about that PSTs' awareness of sustainable development and attitudes towards environmental problems are high level while their behaviors towards environmental issues are medium level. Moreover, the research revealed that both the relationship between PSTs' awareness of sustainable development and their attitudes towards environmental problems and the relationship between PSTs' attitudes towards environmental issues and their behaviors towards environmental issues are positively directed in medium level. On the other hand, the relationship between PSTs' awareness of sustainable development and their behaviors toward environmental problems is positively directed low level. This research is crucial in terms of giving feedback about PSTs' awareness of sustainable development, attitudes and behaviors towards environmental issues and the relationships among these variables to researchers, educators, curriculum designers for teachership programs, academicians and educational policy makers. The current study can contribute significantly to generate new ideas about that which courses and practices about sustainable

development and environmental issues can be placed in higher education or how sustainable development and environmental issues can be integrated with courses, and how academicians can plan their lessons effectively. Education has the key role for achieving sustainable development. Teachers especially science teachers have considerable responsibility to raise awareness about sustainable development of individuals. If science teachers' awareness of sustainable development should be adequate level before graduation of university, they can help students gain awareness about sustainable development. Therefore, they can guide their students' environmentally friendly attitudes and behaviors. Quality education aiming to improve pre-service science teachers' awareness, attitude and behavior levels can make an important contribution to the society's awareness of sustainable development, the society's awareness of local and international environmental problems, and most importantly, the positive change in attitudes and behaviors towards environmental problems.

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