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## **Knowledge, Attitude and Self-efficacy of Pre-service Teachers about Sustainable Development in Pakistan: A Quasi- Experimental Study**

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## **Abstract**

In Pakistani context, little is known about the knowledge, attitude, and self-efficacy of pre-service teachers about sustainable development. This study intends to investigate, through quasi experimental research, whether or not inquiry-based teaching learning activities increases the level of sustainable development literacy of pre-service teachers in terms of knowledge, attitude and self-efficacy towards sustainable development. The quasi-experimental pre-test post-test nonequivalent research design was used. This investigation was carried out on two classes of preservice (BEd) students which were taken as control group and experimental group. The responses of the participants were analyzed through inferential and descriptive statistics. The study clearly indicated that after giving intervention a substantial difference can be seen between the post test scores of treatment group and control group in terms of knowledge, attitude, and self-efficacy of pre-service teachers towards sustainable development while there was insignificant difference between the control group which also contains knowledge, attitude, and self-efficacy of pre-service teachers towards sustainable

development. This paper highlights the need to integrate action oriented sustainable development curricula to the present teacher education programs in Pakistan for the social, economic, and environmental development of pre-service teachers.

**Keywords:** Sustainability Literacy, pre-service teachers, teacher education, education for sustainable development, attitude, self-efficacy.

## Introduction

The developed and developing worlds appear to be two separate groupings in today's world. The United Nations lists Pakistan as one of the world's developing nations. The most common problems that affect developing nations include population growth, a lack of essential services like housing and healthcare, widespread illiteracy, low productivity, and a low standard of living (Zayyad & Toycan, 2018). Our nation has struggled with issues like a high birthrate, primitive farming practices, a lack of contemporary industrial equipment, low levels of literacy, and a shortage of skilled labour, all of which are harmful to socioeconomic progress. One of the main causes of all these problems is the low level of literacy in the nation (Hussain & Alsanad, 2022).

According to one of the world's largest firm KPMG, the GDP growth rate of Pakistan for Fiscal Year 2022 is 5.97% which is higher than the 5.74% in the same period last year.

The National Conservation Strategy (NCS), which was put into effect in 1992, is the key development in Pakistan's environmental movement (Mirza, 2015; Kalsoom et al., 2018; Kalsoom and Qureshi, 2019).

Pakistan made a lot of effort to match the SD instructions with its educational framework and curriculum. In order to achieve this goal, steps have been taken to reinforce and improve educational curricula at all levels in order to develop a pool of skilled SD adherents and practitioners. (Kalsoom, 2019; Kalsoom and Qureshi, 2019).

The purpose of this study is to investigate, comprehensively, whether or not inquiry-based teaching learning activities increases the level of Sustainability Literacy of pre-service teachers in terms of knowledge, attitude and self-efficacy towards SD.

Maxwell, Lambeth, and Cox (2015, p.3) defined Inquiry Based Learning (IBL) "as a system of learning that supports the development of students' problem solving and critical thinking skills, which is crucial for them in everyday activities"

There are few studies that compare empirically and comprehensively IBL method to that which are not inquiry based in Pakistan. Akhter and Fatima (2016) conducted a research and find that firstly, the meager facilities and resources influence the teaching and learning processes and restrict the pre-service educators to use inquiry-based pedagogy. Secondly, the dominant lecture method makes it difficult for pre-service teachers to adopt inquiry-based method. They further claimed that most of the teachers are still dependent on the lecture method while some had initiated questioning with students.

The concept of SD was first presented in the report named as *Our Common Future* in 1987, which is also known as the *Brundtland Report*. The report was issued by the Commission comprised of 19 delegates from 18 countries, headed by the Norwegian Prime Minister, Gro Harlem Brundtland (United Nations World Commission on Environment and Development, 1987; Drexhage and Murphy, 2010). Three key domains: economic, environmental, and social are included in sustainability.

The suggested definition by the WCED was: "Sustainable development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (p.165).

In this study Sustainability Literacy is defined as “The skills and understanding necessary to recognize by the university graduates in order to comprehend the global relationships between environment, society and economy that favor SD”

To attain the above-mentioned purpose of this research this study addressed the following

### **Statement of the Problem**

Pakistan is a country confronting many environmental, social and economic problems. There are various issues to discuss and solve. But, to find the current situation of teacher education in Pakistan and to know the conceptual understanding of pre-service teachers about sustainability, their responses towards different sustainability issues and

their beliefs to teach SD, this research study particularly investigated the effect of Sustainability literacy on knowledge, attitude and self-efficacy of pre-service teachers about sustainability literacy.

### **Significance of the study**

There are many international researches regarding different aspects of sustainable development and sustainability literacy concerning pre-service teachers. But, current study is significant as it is included in those rare research studies which deal with knowledge, efficacy and attitude of pre-service teachers collectively about sustainable development and sustainability literacy in Pakistan.

There are many flaws in the syllabus of prospective teachers and they have lack of conceptual understanding of sustainable development which influence their opinions about sustainability issues and effect their teaching beliefs to teach sustainable development.

Sustainability literacy plays important role to prepare the individuals for the future challenges. As Carney (2011) said that if we want to produce the next generations having scientific outlooks and global minds, then, sustainability literacy is necessary to prepare future teachers.

The syllabus of pre-service teachers have may flaws and they have lack of conceptual understanding of sustainable development which influence their opinions about sustainability issues and effect their teaching beliefs to teach sustainable development. Similarly Pakistan is also facing these issues. Sustainability literacy plays important role to prepare the individuals for the future challenges.

Therefore, this study examined the conceptual understanding of prospective teachers, their responses towards various environmental issues and their confidence in

themselves to teach sustainable development.

### **Research Questions:**

*RQ1.* What is the effect of ESD training of pre-service teachers on their Sustainability Literacy in terms of their knowledge towards SD?

*RQ2.* What is the effect of ESD training of pre-service teachers on their Sustainability Literacy in terms of their attitudes towards SD?

*RQ3.* What is the effect of ESD training of pre-service teachers on their Sustainability Literacy in terms of their self-efficacy towards dealing with issues related to SD?

### **Study Hypotheses**

*Ho1:* There is no significant difference between the knowledge of Sustainability Literacy post-test scores of pre-service teachers between the traditional method group (group 1) and the inquiry method group (group 2), while controlling for their pre-test scores on this test.

*Ho2.* There is no significant difference in the attitude of Sustainability Literacy post-test scores of pre-service teachers between the traditional method group (group 1) and the inquiry method group (group 2), while controlling for their pre-test scores on this test.

*Ho3.* There is no significant difference in the self-efficacy of Sustainability Literacy post-test scores of pre-service teachers between the traditional method group (group 1) and the inquiry method group (group 2), while controlling for their pre-test scores on this test.

### **Literature Review**

In September 2000, leaders from 193 countries joined together at the UN Headquarters in New York to ascertain eight targets to be achieved till 2015 that have later become known as the Millennium Development Goals (MDGs). But, unfortunately these became failed and then to meet challenges and to complete the MDG's incomplete developments, the 17 goals were presented during 25-27 September 2015 by the fellow states of the UN. To achieve the sustainable development goals (SDGs), education plays a significant role. The examples contained poverty elimination and decreasing inequalities (Transforming our World, n.d.).

### **Teacher Education in Pakistan**

In Pakistan, various programs are offered for pre-service teacher education. A student received a Primary Teaching Certificate (PTC) after completing 10 years of education. Similarly, Bachelor of Education (B.Ed.), Master of Education (M.Ed.), and Certificate of Teaching (CT), are awarded after 14, 16 and 12 years of education respectively (Farah, Fauzee & Daud, 2016).

In 1996, Diploma in Education (DIE) was announced Under the Asian Development Bank. Recently, the provincial governments and the Higher Education Commission (HEC) with the support of the United States Agency for International Development (USAID) familiarized a two (or three) year

Associate Degree in Education (ADE), and four year B.Ed Honors (Elementary). In order to make the Pakistani degree compatible with international standards the development of a new four-year B.Ed. Honors Elementary degree began in 2006.

The status of Pre-Service Teacher Education (PSTE) was raised by the establishment of the National Accreditation Council for Teacher Education (NACTE) in 2007 which developed standards for accrediting programs of teachers' education across the country (NACTE, 2009).

### **Sustainability Literacy (SL)**

It is the need of the hour to see and realize the importance of ESD and enhancing Sustainability Literacy of teachers and ultimately of our young generations. UN's environment chief, Inger Andersen said that coronavirus pandemic is a vibrant sign of ongoing climate crisis. The pressure is progressively increasing on the natural world with harmful consequences. It is a warning that failing to take care of the planet meant not taking care of ourselves. The instantaneous urgency is required to protect people from the coronavirus and prevent its spread. "But our long-term response must tackle habitat and biodiversity loss," she added. "There are too many pressures at the same time on our natural systems and something has to give," "We are closely interconnected with nature, whether we like it or not. If we don't take care of nature, we can't take care of ourselves. And as we plunge towards a population of 10 billion people on this planet, we need to go into this future armed with nature as our strongest ally" (Carrington, 2020).

### **Education for Sustainable Development (ESD)**

A social, economic and, environmental change in society can possibly be promoted through the process of education. Environmental education is narrower than ESD. To enable citizens to act for encouraging social and environmental change is the general aim of ESD. Suggesting an action oriented and participatory approach, ESD incorporates methodical tools and concepts from various disciplines to assist the individuals understand the world (Meadows, Meadows & Randers, 1992).

### **Meaning of Knowledge about SD**

Human beings always want to make inquiries about different things. According to the book "Epistemology or Theory of Knowledge" (Coffey, 1917), knowledge is "sui generis" means it is not possible to be defined appropriately by anything other than itself. Knowledge can be demarcated as "justified true belief" (Nonaka and Takeuchi, 1995, p.87).

### **Attitude of Pre-service Teachers Related to Sustainability**

An attitude is a mindset of readiness which is systematized through experiences, applying a vibrant impact on the reaction of individual towards different objects. In simple term attitude is an outlook to perform in a specific way (Allport, 1935). Chunteng (2004), when surveyed school teachers' teaching proficiencies for environmental education (EE), found that a positive attitude affected adversely by the low levels of knowledge and consciousness of teachers about EE.

### **Self-efficacy of Pre-service Teachers about Sustainability**

When a teacher believe in own ability to productively accomplish the tasks of teaching, is called self-efficacy (Moulding *et al.*, 2014, p. 61). It seems to be a significant and inspiring aspect to see the views of pre-service teachers about themselves (Arnold *et al.*, 2011). Beliefs have generally affective, behavioral, and cognitive components (Johnson, 1999).The Self-Efficacy is actually based on social cognitive theory (Bandura, 1986, 1997).

### **Inquiry Method of Teaching**

Students can discover powerful concepts and understandings when the content of science is linked with inquiry process skills (Llewellyn, 2002). In a research study conducted by Plevyak (2007) on pre-service teachers (52 undergraduates) for ten weeks being involved in inquirybased projects and course containing science methods, determined that several prospective teachers commented positively that assessments would become more worthwhile through the use of questioning, inspection, checklists, and rubrics.

### **Methodology**

#### **The study Respondents**

Total 80 pre-service teachers enrolled in B.Ed (Honors), fourth semester, elementary program in Lahore College for Women University, Pakistan (LCWU), were selected as a sample from two intact classes having section A and B for the purpose of experiment.

#### **Data Collection**

Data were collected through self-constructed pre and post-tests from the both control group and treatment group before and after interventions, using questionnaire and all the participants voluntarily participated in this process.

#### **Data Entry and Analysis**

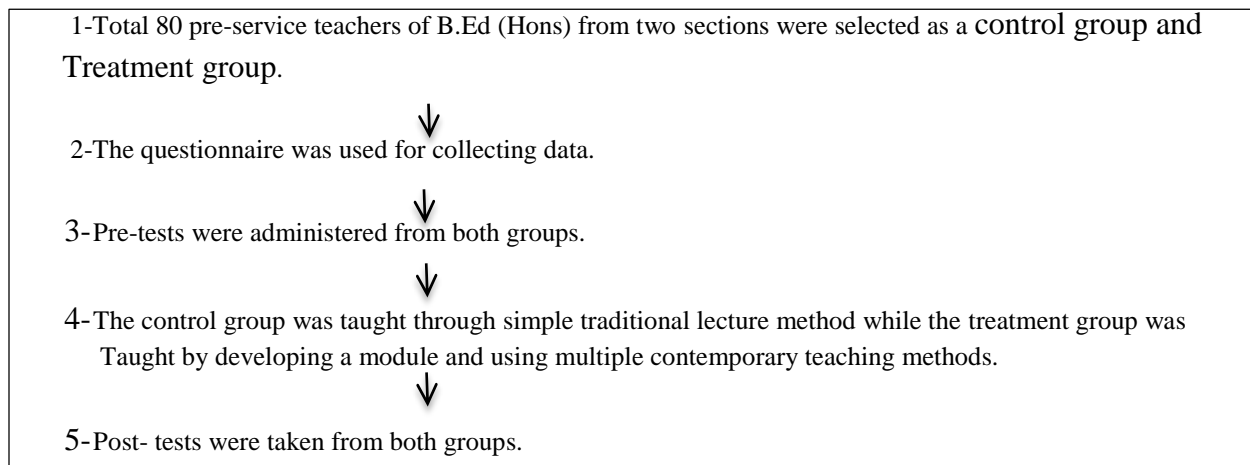
Data were entered using IBM SPSS Version 25 and analyzed using descriptive and inferential statistics. No difficulties were experienced while conducting the analysis.

### **Research Methodology**

The two groups control group and treatment group were present in the current study. There were 40 participants (pre-service teacher) in the control group and 40 participants in the treatment group. The control group was given ‘intervention 1’ as they were taught by traditional (simple lecture) method. The treatment group was given ‘intervention 2’ because these students were taught by developing a specific ESD module (Table I) and using inquiry-based teaching method. The specific module (Table 1) was prepared for treatment group having 40 participants and was used as ‘intervention 2’. This module was consisted of 9 different topics with clearly identifying objectives, teaching methods, and activities for each topic. The duration of these interventions (intervention 1 and intervention 2) was two months.

The most prevalent research design is the one which contained of control group and treatment group. Both of them given a pretest and a post-test but there is no experimental sampling equivalence in the both groups. Instead, the groups involved naturally assembled collectives e.g. classrooms (Campbell, 1963; and Stanley, 1965). The Quasi-experimental method becomes important and can be used when it is impossible to assign individuals in a random way to treatment and control groups (White and Sabarwal, 2014). In the present study, Quasi experimental pre-test post-test nonequivalent groups design was utilized because the control and treatment groups were chosen as intact classes

(Figure 1).



**Figure 1.** Procedure for quasi experimental research

### The Research Instrument

The questionnaire is a source of acquiring information simultaneously from a large group. Replies can be attained about the interests, knowledge, values, opinions, judgments, attitudes, behaviors, preferences, etc. of the respondents by asking questions (Sax, 1979 p. 233). Therefore, a questionnaire is considered to be an appropriate instrument for the present study.

To investigate knowledge, the survey instrument SUSTLIT was adapted from Seattle University which was developed to investigate sustainability literacy (Obermiller and Atwood 2014). The 5-point Likert scale (strongly agree to strongly disagree) is used for 49 knowledge items of SUSTLIT. To measure 'attitude' in a scientific and validated way, Likert scale was devised in 1932 (Edmondson, 2005). Statements on SUSTLIT are formulated in the way that half are about the correct comprehension of sustainability and half are incorrect. Attitude and behavior were also measured through this scale. In the present study, the researcher adapted only 25 statements of knowledge from the SUSTLIT questionnaire while other 11 statements were added according to the context of Pakistan after reviewing the literature considering utmost information required by pre-service teachers. It is comprised of total 21 positive statements and 15 negative statements related to climate change, quality of life, economic growth, and loss of diversity.

To investigate attitude, the scale was developed from two sources i.e. "Attitude Scale for Environmental Issues" which was developed by Saraç and Kan (2015) and a scale developed by Charuvil, Padeettathil Chacko Chacko (2000) to measure attitude and based on 10 concepts. The final questionnaire used for this study consisted of 24 statements. The total 13 positive and 11 negative statements related to teaching, interests of teachers in the environmental activities, contributions of prospective teachers towards ESD, climate change, and loss of biodiversity were included.

To investigate self-efficacy, the scale was developed from two sources i.e instrument for self-efficacy was developed by Boon considering Theory of Planned Behavior of Ajzen (Ajzen & Fishbein, 2005) which claimed that a person's behavior is affected by his intent, that is sequentially stimulated by his beliefs and attitude. The statements 5-8 in the final questionnaire were adapted from this scale. The statements from 1-4, 9-27, and 29-31 were adapted from the scale which was developed by Sagdiq and Sahin (2016). Furthermore, the statements i.e. 28 and 32 were added in line with the context of Pakistani pre-service teachers.

The final questionnaire for self-efficacy comprised of 33 statements having 26 positive and 7 negative statements related to teaching, integrating ESD to education, role of ESD in education and opinions of teachers about: Teachers' professional repertoire, students, activities, curriculum, and social and cultural backgrounds. In this way, the questionnaire used for this study have total 93 statements and three sections. The participant responded to each question using five-point Likert scale from 'strongly agree' (=5), to strongly disagree (=1).

“A pilot study assists in decision-making process, and helps as “a small-scale experiment or set of observations undertaken to decide how and whether to launch a full-scale project” (Collins English Dictionary, 2014). In sum, 20 pre-service teachers were invited for first pilot study to identify any language problem, ambiguity of statements or grammatical error in the questionnaire form. It was asked to students share their thoughts willingly to avoid any uncertainty. The students asked about the two statements i.e. 5 and 12 of the knowledge section. Therefore, these statements were rephrased again and explained to the students but not excluded from the questionnaire. To determine the reliability of the questionnaire, a second pilot study was carried out and again data were gathered from 20 pre-service teachers. Different qualitative explanations were used by authors to interpret alpha values calculated.

For the current study the Cronbach’s Alpha (Cronbach, 1951) was .72 which is acceptable level of reliability (Taber, 2018). Therefore, it was used further.

**Consideration of Research Ethics**

The ‘Informed consent’ is considered as a basis of ethical research (Denzin & Lincoln, 2011). Therefore, the respondents were notified and well versed about the aims of the research study before conducting it. Students were assured that their names and identities would be kept confidential throughout the entire study. Researcher took prior permission from the Department Head in order to conduct research study for the B.Ed (Honors) Elementary program. Researcher also got permission from different researchers (the names of which were discussed in the instrument section) for adopting/adapting their questionnaires.

**Results**

**Pre-tests of Control Group and Treatment Group**

Independent t-test was run to compare the control group and experimental group before interventions. For this purpose, the pre-test was taken from the control group as well as experimental group and then pre-tests of both groups were compared using independent t- test

Table 1

*Comparison between Pre-tests for Control Group and Experimental Group*

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Variables	Groups	N	Mean	Std. Deviation	Std. Error Mean
Knowledge	Control group	40	3.1357	.56967	.09849

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	Experimental group	40	3.1975	.24687	.03898
Attitude	Control group	40	2.9194	1.02115	.26144
	Experimental group	40	3.2240	.34833	.05349
Self-efficacy	Control group	40	3.0364	.76986	.12014
	Experimental group	40	3.3530	.50027	.07918

An independent-samples t-test was conducted to compare the pre-test scores of knowledge, attitude, and self-efficacy for control and experimental groups. There was no significant difference in the control and experimental groups. Mean scores of the control group for knowledge (M=3.1357; SD=.56967), for attitude (M=2.9194; SD=1.02115), and for self-efficacy (M=3.0364; SD=.76986). Mean scores of the experimental group for knowledge (M=3.1975; SD=.24687), for attitude (M= 3.2240; SD=.34833), and for self-efficacy (M= 3.3530; SD=.50027). The magnitude of the differences in the means was very small. Following Cohen, 1988, the effect size for knowledge was very small (eta squared=.005), for attitude it was small (eta squared=.01), and for self-efficacy it was (eta squared=0.03) which is greater than small effect size.

**Post-tests of control group and experimental group**

The researcher applied independent t-test to compare the control group and experimental group after the interventions. For this purpose, the post-test was taken from the control group as well as from experimental group and then post-tests of both groups were compared using independent t-test

Table 2

*Comparison between Post-tests for Control Group and Experimental Group*

Variables	Groups	N	Mean	Std. Deviation	Std. Error Mean
Knowledge	Control group	40	3.3072	.74302	.10167
	Treatment group	40	3.5496	.42163	.06682
Attitude	Control group	40	3.1850	.86003	.12017
	Treatment group	40	3.4718	.38395	.06055
Self-efficacy	Control group	40	3.2742	.44380	.07001
	Treatment group	40	3.6841	.31457	.04958

An independent-samples t-test was conducted to compare the post-test scores of knowledge, attitude, and self-efficacy for control and experimental groups. There was a significant difference in the control and experimental groups. Mean scores of the control group for knowledge (M=3.3072; SD= .74302), for attitude (M=3.1850; SD= .86003),

and for self-efficacy (M=3.2742; SD=.44380). Mean scores of the experimental group for knowledge (M=3.5496; SD= .42363), for attitude (M=3.4718; SD= .38395), and for self-efficacy (M=3.6841; SD= .31457). Following Cohen, 1988, the effect size for knowledge was slightly lower than moderate (eta squared=0.05), for attitude it was moderate (eta squared=0.06) and for self-efficacy it was (eta squared=0.2).

**Pre-test and post-test of control group**

The researcher applied paired sample t-test for the control group after the intervention. For this purpose, the pre-test and post-test of control group were compared

Table 3

*Comparison between Pre-test and Post-test of Control Group*

Groups		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Knowledge	3.1357	40	.56967	.08849
	Knowledge	3.3072	40	.74302	.10167
Pair 2	Attitude	2.9194	40	1.02115	.16144
	Attitude	3.2750	40	.86003	.12017
Pair 3	Self-efficacy	3.1364	40	.76986	.12014
	Self-efficacy	3.2742	40	.44380	.07001

Table 4

*Paired Samples T-test for Knowledge*

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre-test of knowledge Post-test of knowledge	-.17253	1.08634	.17038	-.51596	.17470	-1.028	39	.320

Table 5

*Paired Samples T-test for Attitude*

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 2	Pre-test of attitude Post-test of attitude	-.26662	1.16915	.18338	-.64634	.10519	-1.459	39	.155

Table 6

*Paired Samples T-test for Self-efficacy*

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 3	Pre-test of self-efficacy Post-test of self-efficacy	-.13798	.93795	.15829	-.44782	.16216	-.930	39	.358

A paired-samples t-test was conducted to evaluate the impact of the intervention of control group on students' Scores. There was a statistically non-significant increase in scores of knowledge from pre-test ( $M=3.1357$ ,  $SD=.56967$ ) to post-test [ $M=3.3072$ ,  $SD=.74302$ ,  $t(39)= -1.008$ ,  $p>.05$ ]. There was a statistically non-significant increase in scores of attitude from pre-test ( $M=2.9194$ ,  $SD=.1.02115$ ) to post-test [ $M=3.2750$ ,  $SD=.86003$ ,  $t(39)= -1.449$ ,  $p>.05$ ]. There was a statistically non-significant increase in scores of Self-efficacy from pre-test ( $M=3.1364$ ,  $SD=.76986$ ) to post-test [ $M=3.2742$ ,  $SD=.44380$ ,  $t(39)= -.930$ ,  $p>.05$ ]. Following Cohen, 1988, the eta squared statistic for knowledge (0.03) was greater than small

effect size. The eta squared statistic for attitude (0.05) was slightly less than moderate effect size. The eta squared statistic for self- efficacy (0.02) indicated a small effect size.

**Pre-test and post-test of experimental group**

The researcher applied paired sample t-test for the experimental group after the intervention. For this purpose, the pre-test and post-test of experimental group were compared.

Table 7

*Comparison between Pre-test and Post-test of Knowledge*

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-test of Knowledge	3.1885	40	.24687	.03898
	Post-test of Knowledge	3.5406	40	.42363	.06782

Table 8

*Paired Sample T-test for Knowledge*

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre-test of knowledge Post-test of knowledge	-.35108	.40324	.06476	-.48115	-.22312	-5.522	39	.000

There was a statistically significant increase in scores of knowledge from pre-test

( $M=3.1885$ ,  $SD=.24687$ ) to post-test [ $M=3.5406$ ,  $SD=.42363$ ,  $t(39)= -5.522$ ,  $p<.05$ ]. Following Cohen, 1988, the eta squared statistic for knowledge (0.4) was greater effect size. It means there is an effect of sustainability literacy on the knowledge of pre-service teachers towards sustainable development. Therefore, the null hypothesis will be rejected.

Table 9

*Comparison between pre-test and post-test of attitude*

		Mean	N	Std. Deviation	Std. Error Mean
Pair 2	Pre-test of Attitude	3.2140	40	.34833	.06349
	Post-test of Attitude	3.4718	40	.38395	.06155

Table 10

*Paired Sample T-test for Attitude*

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 2	Pre-test of attitude Post-test of attitude	-.25687	.50950	.08898	-.41662	-.09713	-3.136	39	.003

There was a statistically significant increase in scores of attitude from pre-test ( $M=3.2140$ ,  $SD=.34833$ ) to post-test [ $M=3.4718$ ,  $SD=.38395$ ,  $t(39)= -3.126$ ,  $p<.05$ ]. The beta squared statistic for attitude (0.2) also indicated a great effect size. It means that there is an effect of sustainability literacy on the attitude of pre-service teachers towards sustainable development.

Table .11

*Comparison between Pre-test and Post-test of Self-efficacy*

		Mean	N	Std. Deviation	Std. Error Mean
Pair 3	Pre-test of self-efficacy	3.3530	40	.50027	.07918
	Post-test of self-efficacy	3.6841	40	.31367	.04968

Table 12

*Paired Sample T-test for Self-efficacy*

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 3	Pre-test of self-efficacy Post-test of self-efficacy	-.33206	.67342	.09167	-.61445	-.14867	-3.751	39	.001

A paired-samples t-test was conducted to evaluate the impact of the intervention of experimental group on students' Scores. There was a statistically significant increase in scores of Self-efficacy from pre-test ( $M=3.3530$ ,  $SD=.50027$ ) to post-test [ $M=3.6841$ ,  $SD=.31367$ ,  $t(39)=-3.651$ ,  $p<.05$ ]. The eta squared statistic for self-efficacy (0.3) indicated a great effect size. It means that there is an effect of sustainability literacy on the self-efficacy of pre-service teachers towards sustainable development.

**Discussion**

The results of this study highlighted important ideas for curriculum designers who are interested in embedding education for sustainability of trainee teachers. In Pakistan, ESD is one of the major issues.

The pre-service educators have lack of knowledge about sustainability with effect size of .05 and .005 for treatment and control groups. It might be due to the insufficiency of content knowledge about SD. It is aligned with the study of Kalsoom, Qureshi and Khanum (2019) who analyzed the key teacher education documents underlining the fact that education for teachers in Pakistan has not been highlighted by the ESD.

Same as present study, because of truncated environmental knowledge (Boon, 2010; Puk & Stibbards, 2010; Tal, 2010), previous studies also found the inadequate literacy of environment (Goldman, Yavetz, & Peier, 2006; Tuncer, Boone, Tuzun & Oztekin, 2014). This lack of understanding about environmental issues also contribute to the other researches (CutterMcKenzie & Smith, 2003; Taylor, Kennelly, Jenkins & Callingham, 2006).

Many researches have examined textbooks, elementary school programs and activities. They observed the absence of factual viewpoint regarding ESD (Kaya & Tomal, 2011; Tanriverdi, 2009; Yapıcı, 2003)

The positive attitude towards sustainability issues was recorded with effect size of .01 and .06 for control and experimental groups. This result is quite similar and parallel to the preceding research conducted by Hines, Hungerford and Tomera (1986). The development of positive attitudes of individuals will influenced by the greater knowledge and experience of environment.

Results disclosed that the pre-service teachers have self-efficacy views about sustainability with effect size of .01 and .06 for control group and treatment group respectively, which are small and moderate effect size.

The significant increase ( $M=3.5396$ ) in the knowledge of pre-service teachers can be seen after teaching the sustainable development module, this is aligned with Merritt, Hale and Archambault (2019). The significant increase in their attitude ( $M=3.4708$ ) is also evident in the result of teaching effectively. In this study, the increased difference in self-efficacy ( $M=3.5841$ ) of experimental group was recorded after giving intervention. An association between teacher's efficacy and student achievement has been shown by the research (Goddard, Hoy, & Hoy, 2000; Tschannen-Moran & Barr, 2004). The desired environmental awareness is attained by pre-service teachers through suitable curricular contents which underpinned the necessity to develop curricular material on environmental sustainability at local, national and international level (Sultan, Ajmal & Lodhi, 2016).

## **Conclusion**

A significant increase can be seen in the self-efficacy, attitude, and knowledge of pre-service teachers after teaching sustainable development through inquiry method as compared to traditional method of teaching. More is needed to meet those important objectives that are set by the UN Decade of ESD (2005–2014). In Pakistani colleges and universities, teacher training only consisted of some focused and general concepts. This exposure alone is not enough. Teachers should be provided with proper training on different modern approaches, methods and competencies of teaching SD.

### **Recommendations**

1-It is recommended by the researchers to include a subject of ESD in the curriculum of B.Ed (Honors) elementary degree programs.

2-The researcher recommended to add different social, economic, and environmental activities for pre-service teachers. Teacher training curriculum must include ESD and effective methods and competencies development for pre-service teachers.

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