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Development of a Scale to Measure Environmental Consciousness of Pre-Service Teachers in Punjab, Pakistan

Muhammad Zeeshan	Ph.D. Scholar, University of Education, Lahore, Punjab, Pakistan.
Naima Qureshi	Assistant Professor, University of Education, Lahore, Punjab, Pakistan

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Corresponding Author:

Muhammad Zeeshan

Email: pdf1900011@ue.edu.pk

Abstract: This research aimed to design a scale for measuring pre-service teachers' environmental consciousness. A systematic literature review was carried out to develop initial items for measuring pre-service teachers' environmental consciousness. A total of 64 items were finalized for the scale under five parts, with seventeen items under knowledge, attitude, pedagogies, beliefs, and practices of pre-service teachers regarding environmental consciousness. Through a survey, this scale was administered to 362 pre-service teachers from public sector universities offering teacher education programs in Punjab. The validity of the scale is ensured through expert opinion, and reliability (inter-item consistency) is confirmed through Cronbach's alpha test. The reliability value was found to be .863 for items on the scale. Validity and reliability were statistically tested by conducting exploratory factor analysis. Values of factor loading range from a maximum of .800 to .501. After exploratory factor analysis, a total of 23 items were removed, and the final scale consisted of 41 items. The final scale indicates appropriate reliability and validity regarding five factors related to environmental consciousness. Theoretically, this scale contributes significantly to identifying and measuring the environmental consciousness of pre-service teachers. The scale for environmental consciousness of pre-service teachers could be useful for understanding the environment and also helpful in investigating relation relationship among different variables regarding environmental consciousness.

Introduction

Today the world is facing a number of environmental challenges like climate change and the rapid depletion of natural resources. Environmental-related threats are negatively impacting on health, livelihood, and economic growth of a country. These changes can also affect individuals, their families, whole communities, and even the government (Hassan, 2018). There is an urgent need that citizens should be environmentally literate. The path for building the environmental literacy of citizens is very easy to achieve by linking it with teacher education programs. Promoters of environment-related education have mostly targeted pre-service teacher education programs as a platform

for improving environmental literacy (Mandikonza & Lotz-sisitka, 2016).

The current situation of the environment in the entire world and especially in the south Asian region highlights the problem of worse environmental conditions, and the situation demands environmentally educated citizens. Environment-related education of the 21st century especially focuses on future development and also promotes environmental education as a basic factor of future changes aiming to achieve sustainability (Vinokurova et al., 2015). There is a dire need for the government should commit more to solving current environmental problems and should take greater responsibility for the

deterioration of the environment (Sasaoka, 2014).

In 1972 United Nations conference was held on the topic Human environment to consider the right of a family to live in a healthy and productive environment (Ahmad et al., 2019). The term sustainable development was initially used in the World Conservation Strategy in 1980 (Khushik & Diemer, 2018).

In 1992, heads of different countries signed Agenda -21 on the event of the Earth Summit in Rio-de-Jeneiro (USA) to save the environment. Later on, in 2012, the United Nations Conference was held on Sustainable Development (UNCSD), it is also known as Rio+20. As a 20-year follow-up to this, UNCED Colombia proposed the idea of setting the SDGs. A decade of Education for Sustainable Development was observed in Pakistan from 2005 to 2014 (Mughal et al., 2011).

Environmental Education

Environmental education is regarded as having the capacity for meeting challenges and promoting environmental awareness about different environmental issues leading to a change in the attitude of people for fostering their critical thinking and, as a result, achieving the goal of sustainable development (Joon & Kumar, 2017). Universities are the major source of providing environmental education through both formal and informal means, but they are still unable to educate a larger proportion of the community about environmental and sustainability learning (Pearson et al., 2008).

Education and especially environmental education has to play a significant role in developing awareness, understanding attitude, and specialized skills among members of society for solving environmental problems (Ravindranath, 2007). There should be special emphasis on the content of teacher courses for developing environmental awareness. This is because when teachers are well aware of the environmental problems, they will participate practically to save the environment personally

and also educate others about environmental issues.

Sustainable Development

Sustainable development is defined in terms as “the development that meets the needs of the present without putting into risk the ability of future generations to meet their own needs.” six major areas for achieving global sustainability goals include poverty eradication, sustainable management for the conservation of natural resources; making globalization fit with the sustainable development goals; improving governance mechanism at all levels; and providing funding for research to find different means through scientific and technological innovation to sustain the phase of development (Pearson et al., 2008).

Some researchers have also discussed education for sustainable development with some other names like education for a sustainable future (ESD), sustainable development as a frame of reference, and enhancing learning for a sustainable environment. Research reported that sustainable development is bringing closer social, economic, and environmental factors. (Summers et al., 2010).

Pakistan is also vulnerable to the negative effects of climate change. And now it has become a major concern. Chronic poverty and frequent natural disasters, coupled with political and economic instability, have driven undernutrition in food. It had created serious threats to the economy. Pakistan ranked 5th in the 10th most unstable economies to climate change in the last two decades, with an average Climate Risk Index (CRI) score of 28.83 from 1998 to 2019. Pakistan's third perspective Plan well suggests significant reforms in sustainable development regarding the environment. The 6th Pakistan Environmental protection Act was enacted on 6 December, 1997 to provide protection, conservation, rehabilitation, and improvement of the environment. Pakistan is also a signatory of

international commitments regarding the environment. The most significant was the national conservation strategy (NCS) in 1992 (Ahmad et al., 2019).

The economy of Pakistan show focuses on sustainability which started in the earlier decade of the twentieth century. There was a paradigm shift in the policies of Pakistan for achieving sustainability. Increasing efforts of empowerment, shifting toward devolution of power, decentralization of resources, increasing the role of NGOs, and increasing public-private partnerships in the education and health sector were the main policies that focus on sustainable development (Ahmad et al., 2019). Pakistan's education policy from 1998-2010 reflects concern about the country's environment. This policy guides improvements in the educational system, like the addition of environment-related content in degree classes and the development of new departments as emerging sciences in universities (Mughal et al., 2011).

Considering the effects of environmental education, different conservation strategies are adopted by the nations as a positive step towards the attainment of sustainable development. Strategies access major resources, their proper use, and their conservation for making them available for future use while maintaining a balanced use in society. The current critical situation of the environment and society demands sustainable use of natural resources and providing support for the future environment (Hassan, 2018).

Literature Review

Environmental Consciousness

Environmental consciousness is simply defined in terms of the degree to which an individual shows orientation toward concerns for the environment (Lin & Chang, 2012). It means how people show their attitude towards environmental safety. According to Mathur and Kumari (2013), environmental consciousness is related to psychological factors, which show an

individual's intention towards engagement in pro-environmental behavior of different kinds. Psychological factors demand having proper knowledge about environmental issues and using appropriate action strategies to deal with them. This term also related with sensitivity towards environment protection and it is alternatively also called as environmental sensitivity.

Environmental consciousness is also dealt with as showing a great sense of responsibility towards environmental concerns, making efforts to protect this environment, and also motivating others to show environmentally responsible behavior (Alsmadi, 2008). Environmental consciousness reflects mental responses about the environment and also the impact of positive behavior that motivates other individuals to show environmentally conscious behavior. This demands a paradigm shift from the existing Dominant social paradigm (which assumes that resources are limitless) to a New environmental paradigm (which teaches that growth should be sustainable without harming the environment) (Vieira et al., 2017).

Environmental consciousness is the related ability of a person to understand nature, environmental processes, and problems related to environmental protection. This shows a person's concern with the environment quality and his commitment to positive environmental behavior. An alternate term for environmental consciousness is environmental awareness. There is a need for balanced environmental consciousness development in terms of environmental issues, quality of the environment, and positive behavior for environmental protection (Pui & Yeung, 2006).

The cognitive part of environmental consciousness refers to environment-related knowledge, which includes different ecological processes which act as a baseline to understand the impacts of humans on nature. Relationships between society, nature, and environmental issues caused due to the interaction of these factors. It also includes different environment

protection action strategies to identify and also to critically evaluate the possible remedies to these environment-related issues (Yavetz, Goldman, & Pe'er, 2009). Knowledge is also described as the capacity of an individual to acquire, retain and use relevant information. It is a combination of all comprehensive individual experiences and skills. The cognitive component deals with the ability to pursue and use the most relevant information, understand issues and learning experiences and identify related studying technologies (Bano et al., 2013).

The affective component of environmental consciousness is concerned with an attitude that aligns related environmental knowledge with environment-friendly practices. Attitude is defined as the psychological capacity to analyze activities with some favour or disfavor opinion. Attitude refers to the ways by which someone reacts in a particular situation as per need, interprets the existing situation as per his specific dispositions, and organizes responses and opinions in relation to interrelated structures. Attitudes indicate the results of making reactions in specific ways and, in some situations, observing and explaining based on the result of the reaction or combining into one point of view (Bano et al., 2013). Environmental attitude especially focuses on the interaction between the learner and his environment. Generally, attitudes towards the environment are considered unidirectional and better discussed in the Dunlap tool's new ecological paradigm. He represented the environmental worldview as a paradigm shift from the existing dominant social paradigm (allows unlimited usage of natural resources) to a new ecological paradigm (demands careful use of natural resources). Dunlap has considered this concept as multidimensional and provided three dimensions of environmental attitude which include a balance of nature, limit of growth, and humans dominating this universe. (Uitto et al., 2011)

Environmentally responsible behavior adaptation is the action part of environmental

consciousness. It is a trait and domain which is less studied in research than attitude and understanding (Pui & Yeung, 2006). Practices are the applications of rules and knowledge that guides and shapes our actions. A good practice is an art that is linked with the progress of knowledge and technology and its execution in an ethical manner. Practices identify what knowledge and habits will work together (Bano et al., 2013). Literature reports that there is a gap between people's beliefs and actions is pointed out while studies also reported an increase in people's environmental awareness. The actions of the people in their daily life do not reflect their increased environmental consciousness knowledge (Hiramatsu et al., 2016).

To develop Environmental consciousness, there is a need to provide environmental education to citizens. Changes in the curriculum are required for introducing environmental education at the school level, but it cannot be sustained until its introduction in teacher education curricula. If teachers are well aware of the content related to environmental education, they can easily transfer it to the next generations. The need is arising for the inclusion of environmental education content at all levels of teacher education programs across the country. This incorporation of environmental content in curricula involves material development, setting methodologies, and capacity building of staff for effective implementation of strategies (Ravindranath, 2007).

Environmental education needs to be included as a core concept in the teacher education program content (Wolff et al., 2017). Just the addition of some topics related to environmental education in other subjects will not fulfill the need. For the addition of environmental education in future classrooms, there is a strong need to prepare teacher education faculty members for dealing with this purpose. Standards should be set for content preparation of pre-service teacher education programs. Due to the unavailability of pre-set

standards, most teacher educators are unaware of adding environmental education to their practical classroom teaching (Franzen, 2018).

Accepting the dire need for environmental education, serious efforts have been made to reorganize school education. Environmental education concepts are included in school-level textbooks. But these efforts can't be fruitful until desired changes are made in the curriculum of teacher education programs. The addition of environmental education in the content involves resolving issues like teaching methodologies, development of material, and capacity-building requirements of faculty. It appears in the literature that most courses taught in pre-service teacher education programs lack detailed content about environmental education and sustainability knowledge or pedagogies related to it (Christie et al., 2013).

Education and specifically environmental education, has a key role to play in developing awareness, understanding attitude, and learning specialized skills for better solving environmental problems (Ravindranath, 2007). A study reported that awareness of the community leads them to participate in environmental protection activities. A well-aware community plays a more effective role in environment management than unaware people (Joon & Kumar 2017). There is a need to adequately prepare students of teacher education programs regarding their environmental education and as a prerequisite for their ability to prepare, design and implement environmental education effectively in practical teaching (Yavetz, Goldman, & Peer, 2009).

Role of Teacher Education in developing EC

Teacher education is considered a key strategy for achieving sustainable development (Ferreira et al., 2007). The role of the teacher educator for this purpose is to improve the participation of pre-service teachers in environmental protection activities and participate in critical discourses related to the environment (Wolff et al., 2017).

Pre-service teacher education provides key opportunities for teachers who are willing and have the capability to teach about sustainability for its adaptation in their practical life (Ferreira et al., 2007). It is expected that addressing the process of sustainable development through teacher education will increase its prevalence in schools (Walshe & Tait, 2019).

Teacher education can play an encouraging role in contributing towards sustainable development strategies by producing more environmentally literate citizens. Adequate competencies of pre-service teachers related to environmental education knowledge are required to address their future abilities for organizing, designing, and implementing environmental education (Yavetz, Goldman, & Pe'er, 2009). There is a dire need to enrich environmental education knowledge in the context of teacher education programs. So that teachers may be able to understand appropriately about environmental issues and contribute towards environmental improvement. There is a need to address environmental education-related content in teacher education programs as per the demands of sustainable development (Ravindranath, 2007).

Teacher education can play a vital role in improving the environmental consciousness of pre-service teachers. It will not only trains pre-service teacher to transfer their knowledge and competency to the next generation but also act as a catalyst for the addition of environmental education knowledge at the school level. Teachers are the implementers of policies, and they are in more contact with students and the curriculum. Teachers are expected to have more comprehensive knowledge about environmental sustainability programs and relevant pedagogies to achieve it (Yavetz, Goldman, & Pe'er, 2009).

For achieving a sustainable environment, diffusion of relevant teaching material is required in teacher education program content. It is necessary that environmental sustainability knowledge should be made available at school

level subjects. But to achieve this purpose, a proper framework is required to adopt. Teacher education programs can provide the opportunity to train a generation of environmental sustainability education trained teachers who will ultimately teach at the next level school going learners (Ojedokun, 2012).

Pedagogies used for Environmental Consciousness

Different types of pedagogical approaches include behaviorist, social constructivist, and liberationist approaches. A study provided three forms of environment-sustainable education pedagogies, which include the transmissive approach, transactional and transformative. In university-based education, ITE is a teacher-centered pedagogy and is mostly associated with a transmissive approach which is least useful in sustainability learning (Walshe & Tait, 2019).

Different effective pedagogies for teaching environment-related content include role-playing, group discussion, lectures, dialogues, simulations, debates, stimulus activities, field activities, case studies, critical incidents, personnel development planning, critical reading and writing, field works, and problem-based learning (Evans & Ferreira, 2020). Pedagogies require a teacher to act as a facilitator of learning instead of the director of the whole teaching-learning program. Students are encouraged to investigate their knowledge about sustainability to understand its multidisciplinary nature, engaging both mental domains, cognitive and affective domains of learning (Christie et al., 2013).

A study regarding environmental education teaching pedagogies concluded that role play and simulation enable the students for a depth understanding of the content. These strategies involve different senses that have why not only induce knowledge but improve positive attitudes to develop specified action-oriented learning of students. Similar to role-playing, fieldwork influences students' experiential learning and

develops their emotions for critical learning (Christie et al., 2013). Connected with the discussion method and critical thinking, the lecture method can also work effectively in some situations. The teacher educator and university modeling good environmental protection strategies can also serve as a good teaching method. This will work as an action-oriented learning process and improves the practices of pre-service teachers (Christie et al., 2013).

As a signatory of international commitments, Pakistan also has to take some serious steps to achieve sustainable development goals. Mostly international studies were conducted to achieve sustainable development (Julie Kennelly, 2008). In the Pakistani context, there are limited numbers of research on this area. This research was specifically conducted to design a scale for measuring the environmental consciousness of pre-service teachers in per Pakistani context (B Yavetz et al. 2009).

Research Objective

1. Development of a scale for pre-service teachers' consciousness regarding Environmental consciousness.

Significance of this study

There is a great need to explore and assess the environmental consciousness of pre-service teachers because they are in the future going to teach a wider population. This study suggests pedagogies and provides concrete information about our practices. This study will make its contribution to research related to the environmental dimension. And also serve as starting point for future research in the environmental dimension of sustainable development in the Pakistani context.

This study contributes to measuring the environmental consciousness of Pre-service teachers. There was limited research available in the literature for measuring environmental consciousness. So a scale was developed to measure the construct in per Pakistani context.

This study is helpful for policymakers and other stakeholders of teacher education programs in Punjab.

Methodology

Design

A questionnaire was prepared by consulting questions from three different selectively validated tools (Yavetz, Goldman, & Peer, 2009) and (Effeney & Davis, 2013). The majority of questions were prepared, while some were adapted as per need. These instruments, with the author's permission, were sought properly to use these questions for collecting the responses of Pre-service teachers of Punjab, Pakistan, about their knowledge relating to environmental consciousness. Questions were asked about their knowledge, attitude, pedagogies, beliefs, and practices about environmental consciousness.

The questionnaire consists of five parts. In the first part, questions were asked about the Knowledge of pre-service teachers. This part is further classified into two parts one is about knowledge related to the environment, and the other one is about environmental issues. The second part contains questions about their attitude, the third part of the questionnaire contains questions about Pedagogies adopted for delivering environmental education content, the fourth part is about the beliefs of pre-service teachers regarding the environment, and the fifth last part contains questions about practices. A survey questionnaire was designed to get responses from pre-service teachers so that a large number of respondents can be targeted through these questionnaires.

There are studies available in the literature which search environmental dimension of sustainable development, but they are conducted in an international context. The initial part of this scale measures the knowledge of pre-service teachers. These questionnaires were adapted from the research of Effeney & Davis (2013). The latter part measures their attitude towards the environment to check how their knowledge

affects their attitude. The third part measures pedagogies that are used to deliver content regarding the environment. Pedagogies-related items were prepared and adapted from the study (Christie et al., 2013) Fourth part measures the beliefs of pre-service about the environment, and the last part is about their practices which were prepared and adapted from the study (Yavetz, Goldman, & Peer, 2009). And shows how this knowledge, attitude, pedagogies, and beliefs are being adopted as practices.

Initially, a questionnaire was distributed to 10-15 pre-service teachers of public universities of district Lahore. There were some ambiguous items in the questionnaire which were deleted after the feedback from respondents and the supervisor. Pre-service teachers' responses during pilot testing guided about some irrelevant items which were removed later. Similarly to this, an additional part about beliefs was added at this stage to separate these items from attitude-related items.

Development of Research Scale

The core purpose of this research is to development of a scale for pre-service teachers' Environmental consciousness. Scale is divided into five parts named as knowledge, attitude, pedagogies, beliefs, and practices. The development of a research scale for pre-service teachers' consciousness regarding Environmental consciousness was carried out in different stages: (i) initially available literature is analyzed to operationalize and generate the item pool. A systematic review is conducted to generate the item pool. At the start, the scale consisted of four parts covering the following: knowledge, attitude, pedagogies, and practices. (ii) at the second step, a validation process was conducted with the help of experts. They recommended changes in the scale. In their opinion, another part of beliefs is also added to the scale.

Some minor changes were also recommended in the formatting, which was done. A five parts

scale was finalized with a total of 64 items consisting of seventeen items as knowledge-based, fourteen items as attitude related, nine items in pedagogies part, ten items related to beliefs, and fourteen items covering practices-related statements. After changes scale was resent to experts for final review (iii) At the final stage instrument consisted of five parts with 64 items.

The research scale consists of two sections. In the first section, questions were made about demographic variables like gender, university, campus, degree program, previous science education, subject of the master if done, parents' profession, parent's education, and parent's income per month. The second section contains five parts, namely knowledge, attitude, pedagogies, beliefs, and practices, with a total of 64 items.

Piloting Phase

To design a valid scale, pilot testing is an important process. Validity and reliability are two important characteristics of a good measuring instrument in research (Mohajan, 2017). Pilot testing of the instruments is conducted to remove any ambiguity in the items of the questionnaire. The validity of the instrument is ensured through pilot testing. The use of a validated tool also enhances validity. This research aimed to the development of a scale for pre-service teachers' consciousness regarding Environmental consciousness. The researcher used a five-point Likert-type scale. After the development of the scale, pilot data collection was made from 65 pre-service teachers. While after making appropriate changes identified during piloting, complete data collection was made from 362 pre-service teachers. Later on, collected data was processed in SPSS 26.

For measuring the internal consistency of the items on the scale, Cronbach's alpha test was applied to the collected data. For the complete instrument measuring the environmental consciousness of pre-service teachers value of

Cronbach's alpha was found to be .863, which is a good value to continue further analysis and to be used with minor changes. There are 64 items finalized for use in this scale.

Table 1

Scale: Environmental Consciousness

Reliability Statistics	
Cronbach's Alpha	N of Items
.863	64

Data Analysis and Results

Resulted from the value of Kaiser-Meyer-Oklín was measured at .844, which was significantly greater than the criterion value of .6. Statistical significance was also observed in Bartlett's test of sphericity.

Table 2

KMO and Bartlett's Test		
Kaiser-Meyer-Oklín measure of sampling adequacy		.844
Bartlett's test of sphericity		9571.971
Approx chi-square	df	1953
	Sig	.000

Factor Analysis (FA)

Factor analysis is a data reduction technique. It measures the effectiveness of variables. The literature recommends factor analysis for multifactor scales (Khadim et al., 2021).

Exploratory Factor Analysis (EFA)

In case when a researcher has no clear picture of the association among the structure of variables, exploratory factor analysis is conducted. In this research, exploratory factor analysis is performed to make a prediction about a number of factors (Tabachnick and Fidell, 2007). Unique factors represent the score sections that are not described as common factors. The researcher utilized the statistical package of social sciences

(SPSS-26) for performing exploratory factor analysis. Data analysis was made of 64 items under five dimensions knowledge, attitude, pedagogies, beliefs, and practices. These dimensions analyzed the conception of pre-service teachers regarding environmental consciousness holistically. For the appropriateness of research, data were examined.

The positive association has been exposed as .05 and above. The analysis provided that the five dimensions driving environmental consciousness express coherency to some extent. Out of 64 items, 23 were deleted. For the final instrument, 41 was decided for administering the instrument and confirming the reliability of exploratory factor analysis.

Table 3

Rotated component matrix

Variables	1	2	3	4	5
Beliefs 2	.630				
Beliefs 6	.592				
Attitude 8	.589				
Attitude 3	.581				
Knowledge 14	.564				
Beliefs 3	.563				
Practices 6	.562				
Knowledge 13	.561				
Beliefs 4	.552				
Beliefs 5	.546				
Beliefs 1	.535				
Knowledge 16	.532				
Knowledge 11	.529				
Attitude 4	.520				
Attitude 2	.510				
Practices 12		.700			
Practices 13		.644			
Practices 8		.643			
Practices 10		.638			
Practices 11		.634			
Practices 14		.634			
Practices 9		.629			
Practices 5		.578			
Pedagogies 7			.800		
Pedagogies 3			.762		
Pedagogies 2			.758		
Pedagogies 5			.713		
Pedagogies 8			.713		
Pedagogies 4			.705		
Pedagogies 1			.650		
Pedagogies 6			.624		
Knowledge 5				.588	
Knowledge 4				.587	

Knowledge 9	.556	
Knowledge 2	.516	
Knowledge 3	.513	
Knowledge 8	.500	
Attitude 9		.634
Attitude 14		.605
Attitude 13		.588
Attitude 10		.504

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

a. Rotation converged in 8 iterations.

Screening of data was carried out. Responses of the participants having more than 10% missing data were removed from the final analysis. Those having less than 10% missing values were replaced with median values. Similarly, the standard deviation value of items was checked, and those having less than .25 value were removed. Validity of data strengthened through factor analysis. Rotated factor values ranged from .800 and .500, as detailed in the table above.

The next step procedure of factor analysis was conducted after a descriptive review of available data. All 64 items were analyzed in SPSS software for carrying out exploratory factor analysis. The correlation matrix provided is available at .5 and higher coefficients. Normality was measured, and missing data were also identified, which are necessary to address for factor analysis. Kaiser-Meyer-Olkin test value of .844 was greater than the criteria value of .6 available in the literature (Kaiser 1974). Bartlett's test of sphericity resulted as significant (Bartlett, 1954). The rotated factor matrix shows a wide range of high-loading components, and most variables are loaded significantly in five factors. The final scale consisted of 41 items which showed a higher correlation, and 23 items were deleted, which shows a poor negative association.

Discussion

In previous decades efforts have been made to implement sustainable development progressively in the field of education at all levels. This paradigm provided us with the understanding to make this earth sustainable. It also provided opportunities for building our expertise in dealing with different environmental issues. Universities are arranging training programs for pre-service teachers to adopt sustainable practices. There is a dire need for pre-service teachers to have detailed knowledge about the environment and issues related to it. When they are well aware of the environment and its issues, they can easily transfer this knowledge to the next generations. There is a need to discuss environmental issues in a holistic way in the curriculum of teacher education programmes. So that pre-service teachers can acquire abilities to integrate skills from multiple ways for successfully achieving sustainable development and environmental safety. If education is provided in a meaningful way, it will promote environmental preservation. There is a strong need for every teacher educator and pre-service teacher to have knowledge about root causes that hinders achieving sustainable development and the safety of the environment. They should also be able to suggest alternative practices to meet the goals. Pre-service teachers should

understand diverse aspects of the environment critically and can change their lifestyle as per the demands of environmental safety requirements.

Some researchers are available in the literature regarding environmental consciousness, like (Yavetz, Goldman, & Peer, 2009) and (Effeney & Davis, 2013), but they didn't measure knowledge, attitude, pedagogies, beliefs, and practices holistically on a single scale. Thus no available instrument measures environmental consciousness in a holistic way. As per this study, the environmental consciousness of pre-service teachers is measured in five parts, namely knowledge, attitude, pedagogies, beliefs, and practices. In the instrument, there are two sections first part was about demographics, in which initially questions were asked about demographic variables like gender, university, campus, degree program, previous science education, subject of the master if done, parent's profession, parent's education and parent's income per month and statements about general information about term sustainable development and environmental consciousness. The second section contains five sub-parts, namely knowledge, attitude, pedagogies, beliefs, and practices, with a total of 64 items. This scale was finalized after opinions from experts and EFA were limited to 41 items.

This research mainly covers the concept of environmental consciousness holistically. It is identified in the literature different research tools related to environmental consciousness have measured the knowledge, attitude, pedagogies, beliefs, and practices of pre-service teachers but not holistically on a single scale. Literature reported that a suitable methodology is to conduct a survey to measure environmental consciousness in a holistic way. Validity and reliability of the scale were administered. Validity is confirmed through expert opinion, and pilot testing was conducted to confirm the reliability of the instrument. The value of the reliability test (Cronbach's alpha) was good (.863), and instrument parts were found appropriate to

continue this scale. Finally, after exploratory factor analysis tool consists of five factors or sub-parts with a total number of 41 highly correlated items. The findings of the exploratory factor analysis confirmed the presence of five factors as used in the research.

Conclusion and Future Directions

In Pakistan, environmental consciousness and sustainable development are given the least preference, with the worst condition in the past. Pieces of training need to be arranged for teacher educators and pre-service teachers to enhance their knowledge and learning about environmental consciousness. There is an urgent need for investment in enhancing the environment-related education of pre-service teachers in Pakistan. It can be achieved if teacher education programs are considered a starting point for future education.

Teacher education institutes have to play an active role in the enhancement of environmentally conscious learning through activities in different teacher education programs. Knowledge of pre-service teachers is enhanced about the environment and its issues. Appropriate pedagogies be adopted to deliver environmental education-related content effectively. Environment safety-related learning should practice in daily life. Future research should be done on areas of the use of different pedagogies to improve practices. This scale will act as starting point for further research.

It is concluded that efforts are made to improve the awareness of the public. Through awareness, the quality of life and environment can be improved. Teacher education programs are a suitable pathway to develop environment-related awareness. As a whole, it is suggested to improve the knowledge of people about the environment and its related issues, which will ultimately be helpful in improving their attitudes, beliefs, and practices regarding the environment (Yavetz, Goldman, & Peer, 2009).

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