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PRE-SERVICE TEACHERS' SUSTAINABLE CONSCIOUSNESS: PERCEPTIONS, CONCEPTUALIZATION, AND IMPLEMENTATION OF SDGS IN E-LEARNING

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ABSTRACT

This research study aims to investigate the perceptions of pre-services teachers to comprehend integration of SDGs into their practices. Under cross-sectional survey research method, Sustainability Consciousness Questionnaire (SCQ) was used. All students enrolled in the B.Ed. degree programs of Faculty of Education in Spring 2023 (N= 1235) was considered population for this study. The result revealed that prospective teachers are aware of the SDGs, and their importance in e-learning for a sustainable community. Findings revealed that pre-service teachers possess high perceptions and conceptual clarity regarding sustainable development (SD) goals and practices. However, their actions towards sustainable development are at a satisfactory level, necessitate curriculum interventions and rigorous training.

Keywords: Sustainable development; Teacher education; Prospective teachers; Sustainable consciousness; Environmental sustainability.
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INTRODUCTION

Education for sustainable development (EFSD) is an evolving slogan and part of agenda 2030 (UNESCO, 2015) aimed at equipping students with both theoretical and practical knowledge crucial for protecting the planet and transforming ways to enhance societal well-being (García-González et al., 2020; Leal Filho et al., 2018). These transformations undoubtedly require commitment, motivation and innovation in ideas related to sustainability practiced by different stakeholders such as scientists (to propose solution) and teachers (to prepare future generations) (Dlouhá et al., 2019). In 2015, all 193 countries together outlined pragmatic and impartial strategies to achieve sustainable developmental goals (SDGs) as part of the broader Agenda 2030 to protect the planet and ensure that all people enjoy peace and prosperity (D'Adamo et al., 2023; D'Adamo et al., 2022). García-González et al. (2020) further highlighted the urgency in the current situation due to greenhouse effect, pollution and global warming thus to empower individuals with competencies and knowledge to reflect on their actions. Saqib et al. (2020) explained that meeting the present needs without compromising the ability of future generations to meet their own needs is called sustainable development. Sánchez-Carracedo et al. (2021a) stressed the pivotal role of higher education in preparing future leaders who will have profound impact of their actions on planet sustainability. Therefore, at institutional level, it is important to comprehend the challenges related to inequalities, poverty, fostering respect for resources, encouraging responsible consumption and engaging in dialogues at various platforms for educating the masses. In this context, higher education institutions are now considering sustainability as part of their responsibility and institutional policy (Nguyen et al., 2022). According to the United Nations (2015), universities need to tailor the ways of connecting higher education

with industry, health, and community in pursuit of sustainability (Findler et al., 2019; Trencher et al., 2014). Universities being at the forefront of scientific and technological innovation need to inculcate impactful knowledge in future leaders (students) (Obrecht et al., 2022). In this context, sustainability practices (based on SDGs) are used by universities as ONE key indicator to combat challenges and create social impact (Biancardi et al., 2023). There are three dimensions of sustainable development (SD) initially highlighted in Brundtland (1987) report referred as three pillars of SD. These are environment, economy and society (Gericke et al., 2019; Kasi et al., 2019; Giddings et al., 2002). These pillars (figure 1) are overlapping and interconnected and could help to deeper understanding and changing attitudes about SDGs implemented by various stakeholders for sustainability (Dalampira & Nastis, 2020).

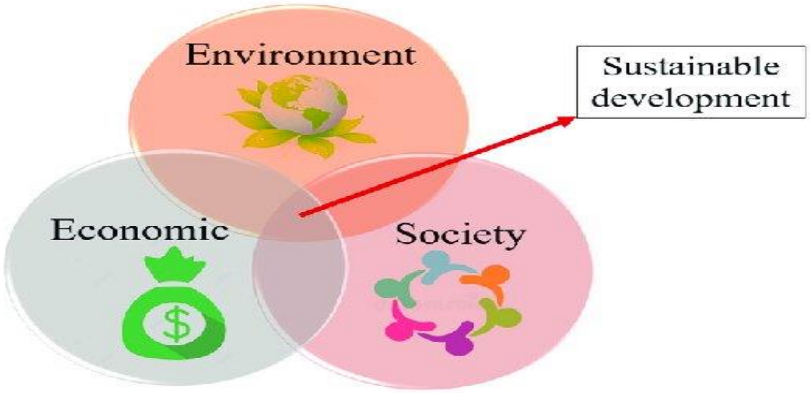

Figure 1. Venn diagram of three pillars of SD (Tran et al., 2023).

Obrecht et al. (2022) conducted a study to investigate the conceptual understanding of environmental topics such as sustainable lifestyles, human rights and greening society across different subjects and study-classes levels (BSc, MSc, PhD). Their study found that master's level students had better insight into core sustainability and environmental topics needed for future environmental challenges (p. nd). In another study, Nguyen et al. (2022) explored four dimensions of sustainable development i.e. critical contextualization of knowledge, sustainable use of resources, participation in community processes, and ethics are assessed in teacher education and reported a gap in knowledge and practices. However, Lozano-Díaz et al. (2023) emphasized that a deep and thorough understanding of university faculty is crucial when teaching SD to students and applying SD-based activities. A case-study reported by Azeiteiro et al. (2015) highlighted the relevance of e-learning in higher education for sustainable development and found interesting results. They analyzed students' responses on six dimensions i.e. general expectations, learning quality, teaching resources, pedagogical tools and evaluation, acquired competences in education for sustainable development, satisfaction and interactions, and reasons to pursue enrolment in a new programme in e-learning context. Their findings indicated that e-learning plays a crucial role in shaping life-long learning and offers smooth transition, thus offering an effective alternative to face-to-face training to implement sustainable practices. Literature also focuses on improving students' knowledge and transforming their behavior related to sustainability issues (Pappas et al., 2015; Murray et al., 2014). Still, at higher education level, there remains a gap between awareness and skills needed to develop sustainable competencies in pre-service teachers. This gap formed the basis for this study, which also explores this construct within e-learning environment as well (Miñano-Rubio et al., 2019; Kieu et al., 2016).

Many studies reported controversial findings regarding gender influence on the perceptions, understanding and actions for sustainability. Nguyen et al. (2022) found significant differences in male and female for their knowledge than actions for community (Álvarez-García et al., 2019; Gilal et al., 2019). Female teachers' educators (TEs) tend to have more positive attitude and eco-friendlier behavior than their male peers (Álvarez-García et al., 2019; Tuncer et al., 2009). However, some studies have found that male exhibit higher levels of understanding and knowledge by male (Bloodhart & Swim, 2020; Luchs &

Mooradian, 2012) as they tend to seek more information related to environment and economy. In the context of above cited literature, following hypothesis was formulated and tested.

$H_{0=}$ There is no gender-wise differences in perceptions, conceptualization and implementation on SD practices of prospective teachers

Operationalizing sustainable development construct

Many researchers are investigating the perceptions of pre-service teachers and their role for sustainability practices in community. The understanding of sustainability practices and actions are significantly different across the literature. Some studies focused on the environmental knowledge of pre -service teachers as competencies for sustainability (Saqib et al., 2020; Imara, 2021; Timm & Barth, 2021; Gilal et al., 2019; Jose et al., 2017). In other studies, three components i.e. knowledge, attitude and behaviors altogether were discussed in relation to sustainability development and practices (Álvarez-García et al., 2019).

According to *The Sustainable Development Report* (SDR) prepared by Sachs et al. (2023), the SDGs in all countries are facing headwinds and are far off track to achieve the agenda of 2030. Similarly, Rahman et al. (2020) prepared a report and highlighted the current rate of progress in Asian countries. They reported that Asian and Pacific countries will not be able to attain any SDGs at a satisfactory level despite significant improvement on many indicators. These findings are conferring to the report of United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP, 2019). According to the Sustainable Development Global Index (2023), a region-wise comparison of the rank and score of developed and developing countries places Pakistan at 128 (Table 1). This ranking highlight significant concerns regarding the awareness and implementation of SDGs at national level by various stakeholders.

Table 1. Scores at SDG index (2023).

County	Score	Rank
Finland	87	1
UK	82	11
Japan	76	21
USA	76	39
China	72	63
Turkey	71	72
Malaysia	70	78
Oman	69	90
Pakistan	59	128

Even though education for sustainable development (EFSD) is an emerging concept, studies revealed that teachers' educators (TEs) are lacking in its conceptualization and basic understanding. Like other countries, Pakistan has also integrated SD knowledge and concepts in teacher education at all levels particularly in teacher-education programs. However, there are still multiple challenges such a lack of clear objectives to add SD curricula at policy level and disparity in perceptions, conceptualization, and implementation at induvial and organizational level (Mirza, 2020). To address these challenges, numerous sustainability-related studies have been conducted in Pakistan, exploring various dimensions of sustainable practices and their integration within academic sector. In some studies, such as those by Jamil et al. (2024), are focusing on the content and activities outlined in textbooks for sustainable practices (textbook analysis). Kalsoom and Khanam (2017) transformed students' attitudes and behaviours regarding environment, society, and economy by employing inquiry-based-action-research to improve sustainability-consciousness (SC) of the prospective teachers. Mirza (2020) investigated the teachers' educators (TEs) orientations regarding SD and found knowledge and understanding below the satisfactory level. Similarly, Ali and Khan (2021) in their qualitive study found that respondents who participated in the study were unaware of sustainable practices while exploring the understanding of the teachers regarding this concept. Similarly, many sustainability-related studies in the Pakistani context report that while knowledge and understanding are at satisfactory levels, this does not translate into corresponding

actions (Saqib et al., 2020; Kasi et al., 2019). Considering the above notion, it seems relevant to clarify the perceptions of pre-service teachers and their conceptual clarity in terms of social, economic, and environmental dimensions. In UNESCO (2015), framework for SD, people's knowledge, attitudes, and behavior are considered essential for EFSD. For the current study, sustainable conscious concept is borrowed from Gericke et al. (2019) and operationalized into three factors as perceptions, conceptualization, and implementations to know the sustainable consciousness of the prospective teachers.

Research Objectives

Following objectives are formulated for current study:

1. To assess the awareness levels of pre-service teachers regarding Sustainable Development practices in the environmental, social, and economic domains
2. To identify the perceptions, conceptualization and implementation of SD practices of pre-service teachers.

Theoretical model and conceptual framework

Miller's pyramid (1990) of skill development is used as theoretical framework in this study (figure 2). Albareda-Tiana et al. (2019) reported using Miller's pyramid for development of skills for sustainable education in their study. This rubric was developed under a research project EDINSOST (Albareda-Tiana et al., 2018) in which a map of sustainability competencies was designed for students at graduate and post-graduate level (though, these skill levels were first used in medical education, but are equally applicable to other professions as well). The purpose of division on this pyramid is to access knowledge, understanding and actions of individuals regarding sustainable practices. In the conceptual model for current study, three levels are mapped on the Miller's pyramid to understand sustainable consciousness.

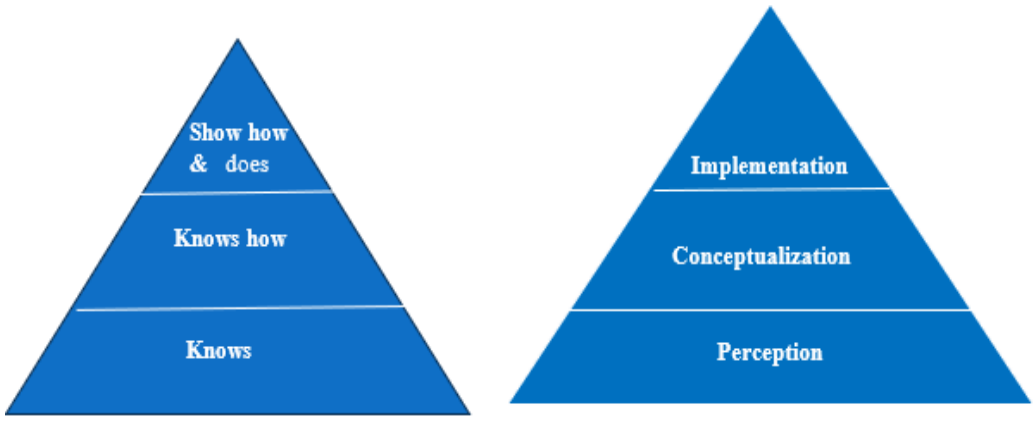

Figure 2. Theoretical model conceptual framework.

METHODOLOGY

A cross-sectional survey research method was employed to explore the perceptions, conceptualization, and implementations of prospective teachers towards SD in online medium.

Population and Sample

In Pakistan, there is only one online university, and the population for this study comprised all students enrolled in the B.Ed. programs in Faculty of Education in Spring 2023 (N= 1235). By using convenient sampling technique, a response rate of 412 (34%) was achieved. The reason for choosing convenience sampling technique is due to typically low return rate in online surveys (Lindemann, 2019) so it was decided to send the questionnaire link to all enrolled pre-service teachers to maximize responses. According to Barch (2023), low sample size may limit the generalizability of research findings and its reliability. The final sample for the current study was 368 after initial screening of data (cleaning and scrubbing).

Instrumentation and Validation

Gericke et al. (2019) developed the "Sustainability Consciousness Questionnaire (SCQ)". For current study, formal permission was sought from author to adopt SCQ. Initially, there were two versions of this questionnaire as follows: SCQ-L and SCQ-S (long with 49 Items and short with 27 items). SCQ-L (49 items) based on Likert scale was used to evaluate SD practices of pre-service teachers in an online environment.

Validity: This questionnaire was sent to three PhD experts for content evaluation. After careful review, nine statements were omitted and five were modified based on their feedback. The final questionnaire consists of forty items, which were rearranged under three factors i.e. perceptions, conceptualization, and implementation.

Reliability: Internal consistency of the scale was ensured through pilot testing. For this purpose, data was collected from fifty online university students. The internal consistency for each dimension was above .7 (Goodboy & Martin, 2020) thus establishing an acceptable level of reliability of the scale.

Table 2. Reliability of the scale.

Factors	Reliability value	Number of Items	Responses
Factor 1 (Perception)	.959	15	368
Factor 2 (Conceptualization)	.943	11	368
Factor 3 (Implementation)	.926	14	368
Complete Scale	.974	40	368

Data Collection

A Google form was created and shared with students through their university email addresses. Ethical guidelines were adhered to, and consent was obtained to keep students' names and personal information confidential. The data collection process continued for two months (April & May 2023), and the link of questionnaire was shared twice in each month to mitigate the low response rate. After collecting data, it was entered in SPSS (version 24) for data cleaning and testing. For data security, password protection files were used which were emailed to the author who analyzed the data.

RESULTS AND DISCUSSION

First, the demographic data was analyzed. Summary of the participants' demographics is shown in Table 3, (n=368).

Table 3. Demographic variables.

Background	Frequency(n)	Percent (%)
Gender		
Male	102	27.7
Female	266	72.3
Have you heard of the notion of Sustainable Development?		
Yes	277	75.3
No	91	24.7

The next question was about how pre-service teachers knew about the SD goals and their agendas. Figure 3 represents the source of information of pre-service teachers in e- learning.

The pie chart illustrates the various sources from which people obtain information about SDGs (Sustainable Development Goals) in their community. A significant 43% of respondents rely on the internet followed by 20% from their institution (university). Newspapers provide SDG information to 13% of those surveyed. Television and friends are each responsible for informing 6% of the people about SDGs. And 5% to 3% of the information falls under categories which include home and others.

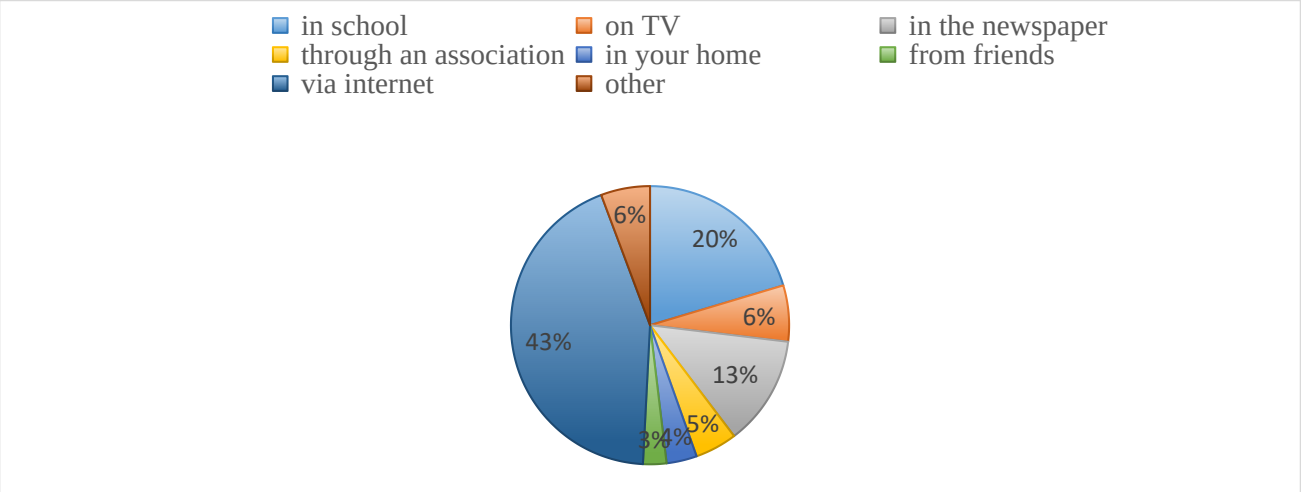

Figure 3. Source of information.

Level of awareness on SD dimensions

To know the awareness level of prospective teachers on three domains of SD practices i.e. environmental, social & economic (objective I), all the items are arranged under three dimensions and then analyzed. Figure 4 shows that pre-service teachers have high mean values for all three domains with slight difference in their awareness level.

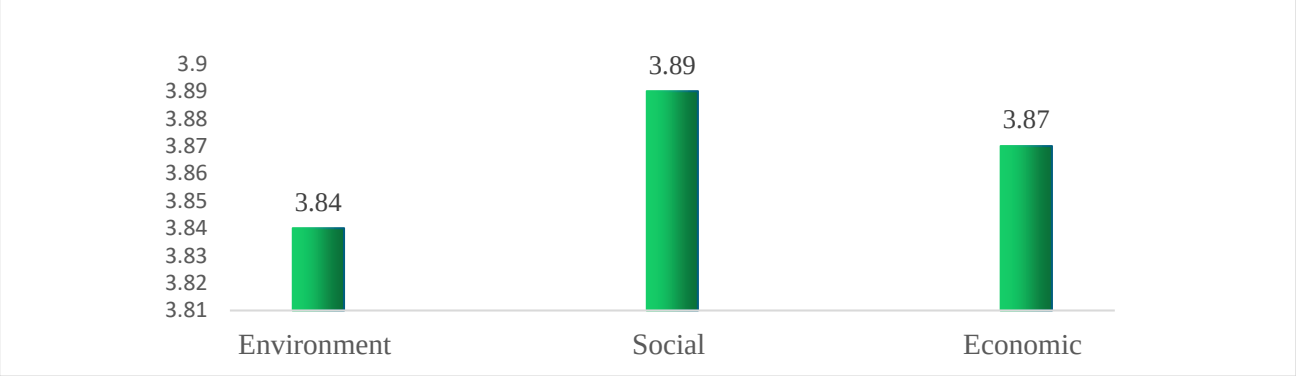

Figure 4. Means on three dimensions of SD.

Perception, Conceptualization, and Implementation of SD

To know the perceptions, conceptualization, and implementation on SD practices of pre-service teachers (objective II), frequencies, means, and SD were analyzed and shared in Tables 4, 5 & 6.

Table 4 indicated that prospective teachers have extremely high perceptions of Sustainable Development goals, with mean value ranging from 3.8-4.0. Table 5 reveals that these teachers possess high conceptual clarity, with mean values ranging from 3.5 to 4.0. Table 6 shows in terms of implementation, students exhibit medium to high means values (3.3 to 4.1).

Table 4. Perceptions of pre-service teachers on SD goals and practices.

Sr. No	Statements	SD f(%)	D f(%)	N f(%)	A f(%)	SA f(%)	Mean ± SD
1	Economic development is necessary for sustainable development.	26 (7.1)	13 (3.5)	49 (13.3)	101 (27.4)	170 (46.2)	4.0 ± 1.26
2	Improving people's health and opportunities for a good life contribute to sustainable development.	26 (7.1)	18 (4.9)	47 (12.8)	126 (34.2)	151 (41)	4.0± 1.17
3	Reducing water consumption is necessary for sustainable development.	46 (12.5)	25 (6.8)	73 (19.8)	118 (32.1)	106 (28.8)	3.6 ± 1.30
4	Preserving nature is necessary for sustainable development.	27 (7.3)	19 (5.2)	55 (14.9)	119 (32.3)	147 (39.9)	3.9 ± 1.19

5	A culture where conflicts are resolved peacefully through discussion is necessary for sustainable development.	29 (7.9)	21 (5.7)	61 (16.6)	107 (29.1)	150 (40.8)	3.9 ± 1.22
6	Sustainable development demands that we humans reduce all sorts of waste	21 (5.7)	28 (7.6)	73 (19.8)	124 (33.7)	122 (33.2)	3.8 ±1.14
7	People who exercise their democratic rights are necessary for sustainable development (for example, they vote in elections, involve themselves in social issues, express their opinions)	29 (7.9)	24 (6.5)	70 (19)	118 (32.1)	127 (34.5)	3.8± 1.21
8	Reinforcing girls' and women's rights around the world is necessary for sustainable development.	26 (7.1)	30 (8.2)	54 (14.7)	121 (32.9)	137 (37.2)	3.8 ± 1.20
9	To achieve sustainable development, all the people in the world must have access to good education.	27 (7.3)	19 (5.2)	44 (12)	122 (33.2)	156 (42.4)	4.0± 1.18
10	To achieve sustainable development, companies must treat their employees, customers and suppliers in a fair way.	25 (6.8)	28 (7.6)	59 (16)	106 (28.8)	150 (40.8)	3.9± 1.21
11	Preserving many different natural species is necessary for sustainable development	21 (5.7)	35 (9.5)	69 (18.8)	127 (34.5)	116 (31.5)	3.8± 1.16
12	Sustainable development demands a fair distribution of, for example, food and medical care among people in the world.	26 (7.1)	29 (7.9)	55 (14.9)	109 (29.6)	149 (40.5)	3.9± 1.22
13	Wiping out poverty in the world is necessary for sustainable development.	28 (7.6)	22 (6)	57 (15.5)	127 (34.5)	134 (36.4)	3.9± 1.19
14	Sustainable development demands that we switch to renewable resources (renewable resources include, for example, wind power, solar panels, ethanol, cardboard packaging.)	32 (8.7)	27 (7.3)	57 (15.5)	120 (32.6)	132 (35.9)	3.9± 1.24
15	Sustainable development demands that people understand how the economy functions.	25 (6.8)	23 (6.3)	63 (17.1)	128 (34.8)	129 (35.1)	3.8± 1.68

Adopted from Gericke et al. (2019).

Table 5. Conceptualization of pre-service teachers on SD goals and practices.

Sr. No	Statement	SD f(%)	D f(%)	N f(%)	A f(%)	SA f(%)	Mean ± SD
1	Everyone ought to be educated to know how to live sustainably.	23(6.3)	22(6)	49(13.3)	127(34.5)	147(39.9)	3.9 ± 1.15
2	Companies have a responsibility to reduce the use of packaging and disposable articles.	24(6.5)	29(7.9)	75(20.4)	126(34.2)	114(31)	3.7± 1.16
3	Using more of nature's resources than we need does not threaten people's health nor their chances for wellbeing in the future.	27(7.3)	25(6.8)	62(16.8)	129(35.1)	125(34)	3.8 ± 1.18
4	We need strict laws and regulations to protect the environment.	29(7.9)	16(4.3)	48(13)	110(29.9)	165(44.8)	4.0 ± 1.21
5	It is important to reduce poverty.	25(6.8)	18(4.9)	45(12.2)	107(29.1)	173(47)	4.0 ± 1.18
6	It is important to do something about problems which have to do with climate change.	28(7.6)	25(6.8)	37(10.1)	126(34.2)	152(41.3)	3.9 ±1.21
7	I think that the government should make all its decisions based on sustainable development.	24(6.5)	20(5.4)	54(14.7)	124(33.7)	146(39.7)	3.9± 1.16
8	It is important that people in society vote in elections and express their views on critical issues.	28(7.6)	13(3.5)	51(13.9)	112(30.4)	164(44.6)	4.0 ± 1.18
9	I think that people who pollute land, air or water should pay for the damage they cause to the environment.	23(6.3)	18(4.9)	53(14.4)	118(32.1)	156(42.4)	4.0± 1.15
10	I think that people throughout the world must be given the same opportunities for education and employment.	26(7.1)	15(4.1)	34(9.2)	115(31.3)	178(48.4)	4.0 ± 1.17
11	It is okay that each one of us uses as much water as we want.	50(13.6)	48(13)	51(13.9)	101(27.4)	118(32.1)	3.5± 1.40

Adopted from Gericke et al. (2019).

Table 6. Implementation of pre-service teachers on SD goals and practices.

Sr. No	Statement	SD	D	N	A	SA	Mean ± SD
1	Where possible, I choose to cycle or walk when I'm going somewhere, instead of travelling by motor vehicle.	26(7.1)	28(7.6)	63(17.1)	126(34.2)	125(34)	3.8 ± 1.19
2	I never waste water.	19(5.2)	31(8.4)	73(19.8)	110(29.9)	135(36.7)	3.8± 1.16
3	I recycle as much as I can.	22(6)	30(8.2)	77(20.9)	126(34.2)	113(30.7)	3.7 ± 1.15
4	When I use a computer or mobile to chat, to text, to play games and so on, I always treat others as respectfully as I would in real life.	18(4.9)	23(6.3)	48(13)	129(35.1)	150(40.8)	4.0 ± 1.10
5	I often do things which are not good for my health.	49(13.3)	59(16)	76(20.7)	99(26.9)	85(23.1)	3.3 ± 1.34
6	I do things which help poor people.	18(4.9)	21(5.7)	46(12.5)	126(34.2)	157(42.7)	4.04 ± 1.10
7	I pick up rubbish when I see it out in the countryside or in public places.	13(3.5)	37(10.1)	84(22.8)	125(34)	109(29.6)	3.7 ± 1.09
8	I think we should not harm the natural environment.	19(5.2)	20(5.4)	41(11.1)	86(23.4)	202(54.9)	4.1 ± 1.14
9	I always separate food waste before putting out the rubbish when I have the chance.	20(5.4)	28(7.6)	59(16)	119(32.3)	142(38.6)	3.9± 1.15
10	I do things to reduce waste (e.g., throwing away less food and not wasting paper).	19(5.2)	18(4.9)	60(16.3)	127(34.5)	144(39.1)	3.9 ± 1.10
11	I work on committees (e.g. the student council, my class committee, the cafeteria committee) at my school for sustainable development.	24(6.5)	43(11.7)	76(20.7)	108(29.3)	117(31.8)	3.6± 1.21
12	I treat everyone with the same respect, even if they have another cultural background than mine.	17(4.6)	16(4.3)	56(15.2)	111(30.2)	168(45.7)	4.0 ± 1.09
13	I watch news programs or read newspaper articles to do with the economy.	20(5.4)	34(9.2)	88(23.9)	116(31.5)	109(29.6)	3.7± 1.15
14	I show the same respect to people, boys and girls.	17(4.6)	20(5.4)	38(10.3)	170(46.2)	123(33.4)	3.9± 1.03

Adopted from Gericke et al. (2019).

Inferential statistics

To test hypothesis H01, independent sample t-test was applied on perceptions, conceptualization and implementation separately (Tables 7, 8, 9). As significant difference was found.

Table 7. Difference in perceptions between Male and Female Respondents.

Perceptions	N	Mean	SD	F	Sig	t	df
Female	266	43.8	10.1	2.76	0.02	2.23	366
Male	102	41.1	11.2				

An independent samples t-test was conducted to compare the mean scores of the measured variable between female and male participants. The results indicated that there was a significant difference between the two groups, $t(2.230) = .02$, $p < .05$. Female participants ($M = 43.8$, $SD = 10.1$) had a significantly higher mean score than male participants ($M = 41.1$, $SD = 11.2$).

Table 8. Difference in Conceptualization between Male and Female Respondents.

Conceptualization	N	Mean	SD	F	Sig	t	df
Female	265	58.5	13.8	3.92	0.11	1.588	164.45
Male	102	55.7	15.7				

An independent samples t-test was conducted to compare the mean scores of the measured variable between female and male participants. The results indicated that there was no significant difference between the two groups, $t(164.4) = .11$, $p > .05$.

Table 9. Difference in Implementation between Male and Female Respondents.

Implementation	N	Mean	SD	F	Sig	t	df
Female	266	55	10.9	4.77	0.01	2.562	164.4
Male	102	51.4	12.4				

An independent samples t-test was conducted to compare the mean scores of the measured variable between female and male participants. The results indicated that there was a significant difference between the two groups, $t(164) = 2.56$, $p < .05$. Female participants ($M = 55.0$, $SD = 10.9$) had a significantly higher mean score than male participants ($M = 51.4$, $SD = 12.4$).

Discussion

The purpose of EFSD is to transform and inspire young minds to think critically regarding sustainable development goals and their actions to minimize its impact at the societal level. Many sustainability-related studies in the Pakistani context reported that knowledge and understanding are at satisfactory levels (Saqib et al., 2020; Kasi et al., 2019). These findings are aligned with the current study as pre-service teachers have higher perceptions and conceptual clarity of SD goals and practices. However, regarding implementation, a medium level of means was found. García-González et al. (2020) reported an increase in students' awareness, knowledge, and implementation after training workshops on sustainable development practices. In his qualitative study, Gunduz et al. (2024) also reported similar findings that pre-service science teachers have average awareness but lack sufficient knowledge to practice and implement these concepts. Nguyen et al. (2022) reported that pre-service teachers are unsure about the meaning of sustainable development and have an insufficient understanding of this concept (Guerra & Smink, 2019). However, their knowledge was found to be slightly higher when compared with behavior as reported in this study, it is further noticed that elementary pre-service schoolteachers' attitude towards environmental issues was positive, however, their actions were found to be at a moderate level. Sánchez-Carracedo et al. (2021b) reported that pre-service teachers scored high on lower levels (knowing) as compared to upper levels (how and does) of competency taxonomy for sustainable development. The prospective teachers' actions towards the community are the least responded factor (Valderrama-Hernández et al., 2019) thus provides the opportunity to think critically and are committed to actions. Result of inferential statistics are also aligned with literature. Nguyen et al. (2022) found significant differences in male and female for their knowledge than actions for community (Álvarez-García et al., 2019; Gilal et al., 2019). Female teachers' educators (TEs) tend to have more positive attitude and eco-friendlier behavior than their male peers (Álvarez-García et al., 2019; Tuncer et al., 2009).

CONCLUSIONS AND RECOMMENDATIONS

This preliminary study aimed to contextualize the Sustainable Development Consciousness Questionnaire within the Pakistani context. One limitation of this study is that the sample consisted solely of pre-service teachers. Future research should include a broader range of participants from different disciplines, to provide a more comprehensive understanding of the topic. The findings revealed that pre-service teachers possess high perceptions and conceptual clarity regarding sustainable development (SD) goals and practices, which align with previous studies. However, a disparity between knowledge, conceptualization, and implementation exists which requires reevaluating. The result needed to be seen with caution as students tend to project themselves positively in the self-reported questionnaire. Future studies may be conducted in inter- and trans-disciplinary subjects to gain a comprehensive understanding of sustainable development concepts and perspectives. The sample of the current study may be contacted again for a qualitative study to have more in-depth understanding of their concepts and actions. The curricula of four years concurrent degree programs for pre-service teachers and other disciplines have more space to include topics, case studies, and projects on SD training and hands-on experiences.

REFERENCES

Albareda-Tiana, S., García-González, E., Jiménez-Fontana, R., & Solís-Espallargas, C. (2019). Implementing pedagogical approaches for ESD in initial teacher training at Spanish universities. Sustainability, 11(18), 4927.

Albareda-Tiana, S., Vidal-Raméntol, S., Pujol-Valls, M., & Fernández-Morilla, M. (2018). Holistic approaches to develop sustainability and research competencies in pre-service teacher training. Sustainability, 10(10), 3698.

Ali, I., & Khan, A. M. (2021). Investigation of the Conceptual understanding of primary school teachers regarding sustainable development goals in Punjab. Journal of developmental and social sciences, 2 (3), 551-563.

Álvarez-García, O., García-Escudero, L. Á., Salvà-Mut, F., & Calvo-Sastre, A. (2019). Variables influencing pre-service teacher training in education for sustainable development: A case study of two Spanish universities. Sustainability, 11(16), 4412.

Azeiteiro, U. M., Bacelar-Nicolau, P., Caetano, F. J., & Caeiro, S. (2015). Education for sustainable development through e-learning in higher education: experiences from Portugal. Journal of Cleaner Production, 106, 308-319.

Barch, D. M. (2023). The Dangers of Small Samples and Insufficient Methodological Detail. Schizophrenia bulletin, 49(1), 5-6.

Biancardi, A., Colasante, A., D'Adamo, I., Daraio, C., Gastaldi, M., & Uricchio, A. F. (2023). Strategies for developing sustainable communities in higher education institutions. Scientific Reports, 13(1), 20596.

Bloodhart, B., & Swim, J. K. (2020). Sustainability and consumption: what's gender got to do with it?. Journal of Social issues, 76(1), 101-113.

Brundtland, G. (1987). Report of the World Commission on Environment and Development: Our Common Future. United Nations General Assembly document A/42/427.

D'Adamo, I., & Gastaldi, M. (2023). Monitoring the Performance of Sustainable Development Goals in the Italian Regions. Sustainability, 15(19), 14094.

D'Adamo, I., Gastaldi, M., & Morone, P. (2022). Economic sustainable development goals: Assessments and perspectives in Europe. Journal of Cleaner Production, 354, 131730.

Dalampira, E. S., & Nastis, S. A. (2020). Back to the future: simplifying Sustainable Development Goals based on three pillars of sustainability. International Journal of Sustainable Agricultural Management and Informatics, 6(3), 226- 240.

Dlouhá, J., Heras, R., Mulà, I., Salgado, F. P., & Henderson, L. (2019). Competences to address SDGs in higher education—A reflection on the equilibrium between systemic and personal approaches to achieve transformative action. Sustainability, 11(13), 3664.

Findler, F., Schönherr, N., Lozano, R., Reider, D., & Martinuzzi, A. (2019). The impacts of higher education institutions on sustainable development", International Journal of Sustainability in Higher Education, 20, 1, 23-38.

García-González, E., Jiménez-Fontana, R., & Azcárate, P. (2020). Education for sustainability and the sustainable development goals: Pre-service teachers' perceptions and knowledge. Sustainability, 12(18), 7741.

Gericke, N., Boeve-de Pauw, J., Berglund, T., & Olsson, D. (2019). The Sustainability Consciousness Questionnaire: The theoretical development and empirical validation of an evaluation instrument for stakeholders working with sustainable development. Sustainable Development, 27(1), 35-49.

Giddings, B., Hopwood, B., & O'Brien, G. (2002). Environment, economy and society: Fitting them together into sustainable development. Sustainable Development, 10, 187–196.

Gilal, F. G., Ashraf, Z., Gilal, N. G., Gilal, R. G., & Channa, N. A. (2019). Promoting environmental performance through green human resource management practices in higher education institutions: A moderated mediation model. Corporate Social Responsibility and Environmental Management, 26(6), 1579-1590.

Goodboy, A. K., & Martin, M. M. (2020). Omega over alpha for reliability estimation of unidimensional measures. Annals of the International Communication Association, 44(4), 422-439.

Guerra, A., & Smink, C. K. (2019). Students' perspectives on sustainability. Encyclopedia of Sustainability in Higher Education, 1560-1568.

Gunduz, T., Zorluoglu, S. L., & Sahinturk, A. (2024). Views of preservice science teachers on sustainable development awareness. Eğitimde Kuram ve Uygulama, 20(1), 1-20. https://doi.org/10.17244/eku.1172318

Imara, K., & Altinay, F. (2021). Integrating education for sustainable development competencies in teacher education. Sustainability, 13(22), 12555.

Jamil, M., Nosheen, S. S., & Saleem, A. (2024). Sustainability education in Pakistan: Qualitative content analysis of English textbook grade X. Journal of Social & Organizational Matters (JSOM), 3(2), 1-11.

Jose, S., Patrick, P. G., & Moseley, C. (2017). Experiential learning theory: the importance of outdoor classrooms in environmental education. International Journal of Science Education, Part B, 7(3), 269-284.

Kalsoom, Q., & Khanam, A. (2017). Inquiry into sustainability issues by preservice teachers: A pedagogy to enhance sustainability consciousness. Journal of cleaner production, 164, 1301-1311.

Kasi, A. M., Raziq, A., & Khan, N. R. (2019). Exploring Environmental Sustainability Practices in Pakistani SMEs. JISR Management and Social Sciences & Economics, 17(2), 17–34.

Kieu, T. K., Singer, J., & Gannon, T. J. (2016). Education for sustainable development in Vietnam: Lessons learned from teacher education. International Journal of Sustainability in Higher Education, 17(6), 853-874.

Leal Filho, W., Raath, S., Lazzarini, B., Vargas, V. R., de Souza, L., Anholon, R., L. (2018). The role of transformation in learning and education for sustainability. Journal of cleaner production, 199, 286-295.

Lindemann, M. (2019). How great wars end: legacies and lessons: German studies association presidential address 2018. German Studies Review, 42(2), 339-352.

Lozano-Díaz, A., Fernández-Prados, J. S., Bernal-Bravo, C., & Velasco-Muñoz, J. F. (2023). Educating Preservice Teachers in Sustainability: Conceptions, Values and Attitudes of Students and Lecturers at the University. International and Multidisciplinary Journal of Social Sciences, 12 (3), 239-259.

Luchs, M. G., & Mooradian, T. A. (2012). Sex, personality, and sustainable consumer behaviour: Elucidating the gender effect. Journal of Consumer Policy, 35, 127-144.

Miller, G. E. (1990). The assessment of clinical skills/competence/performance. Academic medicine, 65(9), S63-7.

Miñano-Rubio, R., Uribe, D., Moreno-Romero, A., & Yáñez, S. (2019). Embedding sustainability competences into engineering education. The case of informatics engineering and industrial engineering degree programs at Spanish universities. Sustainability, 11(20), 5832.

Mirza, M. S. (2020). Teacher Educators' Preparedness for Re-Orienting Teacher Education Programs for Sustainable Development in Pakistan. Journal of Research & Reflections in Education (JRRE), 14(1), 1-15.

Murray, P., Douglas-Dunbar, A., & Murray, S. (2014). Evaluating values-centred pedagogies in education for sustainable development. International Journal of Sustainability in Higher Education, 15(3), 314-329.

Nguyen, L. H. P., Bui, N. B. T., Nguyen, T. N. C., & Huang, C. F. (2022). An investigation into the perspectives of elementary pre-service teachers on sustainable development. Sustainability, 14(16), 9943.

Obrecht, M., Feodorova, Z., & Rosi, M. (2022). Assessment of environmental sustainability integration into higher education for future experts and leaders. Journal of Environmental Management, 316, 115223.

Pappas, E., Pappas, J., & Sweeney, D. (2015). Walking the walk: Conceptual foundations of the Sustainable Personality. Journal of Cleaner Production, 86, 323-334.

Rahman, M., Khan, T. I., & Sadique, M. Z. (2020). SDG Implementation progress: What does the Asian experience reveal?. Retrieved online from: http://southernvoice.org/wp-content/uploads/2020/01/200122-Summary-ASIA-FINAL.pdf.

Sachs, J.D., Lafortune, G., Fuller, G., Drumm, E. (2023). Implementing the SDG Stimulus. Sustainable Development Report 2023. Paris: SDSN, Dublin: Dublin University Press, 2023. 10.25546/102924 SDG Academy. Available from: https://sdgacademy.org.

Sánchez-Carracedo, F., Romero-Portillo, D., Carbonell, B. S., & Moreno-Pino, F. M. (2021b). Education for sustainable development in Spanish higher education: an assessment of sustainability competencies in engineering and education degrees. International Journal of Sustainability in Higher Education, 23(4), 940-959.

Sánchez-Carracedo, F., Ruiz-Morales, J., Valderrama-Hernández, R., Muñoz-Rodríguez, J. M., & Gomera, A. (2021a). Analysis of the presence of sustainability in Higher Education Degrees of the Spanish university system. Studies in Higher Education, 46(2), 300-317.

Saqib, Z. A., Zhang, Q., Ou, J., Saqib, K. A., Majeed, S., & Razzaq, A. (2020). Education for sustainable development in Pakistani higher education institutions: An exploratory study of students' and teachers' perceptions. International Journal of Sustainability in Higher Education, 21(6), 1249-1267.

Timm, J. M., & Barth, M. (2021). Making education for sustainable development happen in elementary schools: the role of teachers. Environmental Education Research, 27, 50-66.

Tran, D. B., Tran, V. T., Pham, X. A., & Nguyen, V. T. (2023). A General framework for sustainability assessment of buildings: A life-cycle thinking approach. Sustainability, 15(14), 10770.

Trencher, G., Yarime, M., McCormick, K., Doll, C., & Kraines, S. (2014). Beyond the third mission: Exploring the emerging university function of co-creation for sustainability", Science and Public Policy, Vol. 41 No. 2, pp. 151-179

Tuncer, G., Tekkaya, C., Sungur, S., Cakiroglu, J., Ertepinar, H., & Kaplowitz, M. (2009). Assessing pre-service teachers' environmental literacy in Turkey as a mean to develop teacher education programs. International Journal of educational development, 29(4), 426-436.

UNESCAP (2019). United Nations Economic and Social Commission for Asia and the Pacific. SDG Gateway [Data set]. Retrieved from: http://data.unescap.org/escap_stat/.

UNESCO. (2015). Education for sustainable development goals: Learning objectives. Paris, France: UNESCO

United Nations. (2015). Transforming Our World: The 2030 Agenda for Sustainable Development; United Nations: Paris, Available online: https://sustainabledevelopment.un.org/post2015/transformingourworld/publication.

Valderrama-Hernández, R., Sánchez-Carracedo, F., Alcántara Rubio, L., & Limón-Domínguez, D. (2019). Methodology to analyze the effectiveness of ESD in a higher degree in education. A case study. Sustainability, 12(1), 222.