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Investigation of Knowledge, Attitudes, Practices toward Environmental Sustainability among Omani college students

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Abstract

Previous studies focused on the examination of general knowledge and awareness on environmental issues. Gaps in research revealed that there are still some misconceptions and lack of knowledge, attitudes and practices on environmental sustainability. Thus, this study investigated the knowledge, attitudes and practices toward environmental sustainability among Omani college students. It employed a quantitative approach with descriptive and inferential statistics. It utilized a 15-item Likert scale self-made questionnaire through google form survey among college students at Bayan College, Oman. It used SPSS version 26 for data analysis. Reliability test showed acceptable internal consistency of Cronbach's Alpha =.834. Descriptive statistics revealed that Omani college students have a low level of knowledge about the programs, projects and/or organizations working on environmental issues in their community. They also have a low level of knowledge on waste segregation management. Results implied that respondents' environmental practices on sustainable energy use and water conservation are highly evident. Results implied the need for strengthening community-based environmental programs and activities. Results for exploratory factorial analysis revealed high loadings. Results implied that even if Omani college students have high level of knowledge of recycling practices and moderate level of knowledge about use of low carbon development strategies that impact reduction of climate change and conservation of sustainable energy toward environmental sustainability, it does not necessarily follow that they have high level of environmental practices such as waste segregation practices according to recycling types. Results of the study also implied that there is an urgent need to leverage strategic and coordinated mechanisms in higher education for the promotion and implementation of community-based and campus-based policies, programs, workshops and training on

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promoting environmental sustainability. Results also implied that there is a need to leverage strategic implementation and use of public transportation and/ or bicycles in Oman towards promotion of a green economy. Thus, this implied that environmental governance could be mobilized by multi-stakeholders for the welfare of Oman constituents.

1. Introduction

Our world today is terribly bombarded with drastic challenges that bring adverse effects to humanity. One of these problems is environmental degradation. That said, the need for environmental sustainability is an urgent concern. 'Environmental sustainability is a concept of preserving raw resources such as energy, air, water and plants that are essentially important in the physical environment (Sutton, 2004). 'It is strongly connected to social and economic sustainability' (Morelli, 2011). Clearly, people depend on the physical environment tremendously. Hence, the long-term survival of people and societies can be attributed to the maintaining of desirable environmental conditions (Halim et al. 2022). Arguably, economic viability is strongly dependent on natural resources and service flows, which means economic sustainability is also dependent on environmental sustainability (Sutton, 2004). Therefore, in order to enjoy these services over the course of time, humanity must live a' sustainable lifestyle and behavior' within the limitations of the biophysical environment (Lubowiecki-Vikuk et al. 2021; Moldan, 2012).

In pursuit of sustainability, the United Nations (UN) adopted the 2030 Agenda for Sustainable Development and its 17 goals. Sustainable development means meeting present needs without putting the needs of future generations in jeopardy (Sustainable Development Summit, 2023). In fact, our shared planet and our communities' survival depends on a more sustainable world (Sustainable Development Summit, 2023). Meanwhile, the 17 SDGs highlighted the significant challenges for human sustainable development and acknowledged that concerted efforts within these goals hold interwoven outcomes. One of the dimensions underscored in the 2030 Agenda was to push the initiatives for the Green Economy. According to the UN Environment Program, the green economy is defined as low carbon, resource efficient and socially inclusive. In a green economy, there is growth in income and employment through public and private investment into infrastructure, assets and economic activities that promote low carbon emissions and pollution, improved energy and resource efficiency, and preventive loss of

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biodiversity and ecosystem services (UNEP). In the preamble to the 2030 Agenda for Sustainable Development, world leaders affirmed their unwavering support to protect the planet from degradation through sustainable production and consumption, sustainable management of its resources and imperative action on climate change.

Sustainable development and human well-being can be achieved through sustainable communities that lead to healthy communities (Black, 2004). People's environmental knowledge and behavior is crucial to achieving a sustainable society. According to Chukwuma (1998), public awareness plays a vital role in nature preservation rather than environmental policy. This has been backed up by various studies that the level of knowledge, attitudes, values and practices are significant factors in determining the quality of the environment (Schulitz & Oskamp, 1996; Mansaray A & Abijoye, 1998). More importantly, higher levels of environmental knowledge show better impulse to act positively on environmental issues (Liobikienė & Poškus, 2019; Paço & Lavrador, 2017). Moreover, environmental knowledge can improve the sustainability practices such as 'reducing or eliminating waste that can cause environmental degradation' (Birou et al. 2019).

Undoubtedly, the role of higher education institutions remains significant through research and pedagogy that supports positive actions of individuals toward environmental sustainability. As institutions, they are intended to develop students' SD skills to become active agents of change. In order to be at par with the 2030 Agenda for Sustainable Development, Sustainable Development Competencies (SDCs) as a component of ESD are integrated in HEIs curriculum. SDCs aim to equip learners with specific knowledge and abilities that propel them to achieve a certain level of public awareness on environmental sustainability. In ESD education, SDCs development is achieved through learner-centered, collaborative, interdisciplinary, transdisciplinary, real-world, and value-based teaching. Another benefit of HEIs is having an opportunity for ESD values to be physically demonstrated on campuses which can be expressed through education and research. Thatsaid, environmental education is essential for supporting individual accountability that leads to the protection of local and global environments (Stevenson, 2007).

According to the study of Şahin and Erkal (2017), it articulated the significance of

educating university students about environmental sustainability. Universities play vital roles in developing sustainable environmental values (Şahin & Erkal 2017). This implies that promoting education toward environmental sustainability can provide holistic attitudes, values, and behaviors (Summers, Kruger, Childs, & Mant, 2000). A previous study corroborated the importance of integrating knowledge-based and ethical standards toward environmental sustainability problems to promote responsible behaviors of students (Huckle, 1993).

Sustainable Development Competencies (SDCs) as a component of ESD are utilized by applying these metrics in the HEIs curriculum. Learners should achieve specific knowledge and abilities concerning sustainable development, categorized as the Sustainable Development Competencies. For ESD education, learner-centered, collaborative, interdisciplinary, transdisciplinary, real-world, and value-based teaching and learning areadvised, enabling SDCs development. HEIs must equip these students to deal with such issues by incorporating sustainability into their curricula, ensuring that future leaders contribute to local, state, and regional economic growth. The added benefit of HEIs is that there is an opportunity for ESD values to be physically demonstrated on campuses, which can be expressed in several dimensions of HEIs, such as education and research. Therefore, environmental education was observed to encompass in-school and out-of-school endeavors and public awareness. Indeed, environmental sustainability is an endless journey. It demands continuous developments and improvements that result in new achievements and challenges.

Interestingly, Oman has become an emerging frontrunner in its commitment to Environmental, Social, and Governance (ESG) practices (Al Ghaithi, 2023). Through its ambitious investments in energy transition and decarbonization projects, Oman is taking the lead towards net zero emissions by 2050. Despite these considerable strides, Oman's economic growth has slowed down in recent years. This posed a pressing concern. Hence, Oman launched its Oman Vision 2040, a long-term development plan, with the aim to diversify its economy while also promoting sustainable development (Al Alawi & Jawarneh, 2023). Several studies in Oman had been conducted to strengthen the implementation of these projects. For example, Al-Jabri (2017) examined the potential benefit of renewable energy in economic diversification and posited that it is crucial to

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sustainable development in Oman. Similarly, Al-Hinai (2016) studied the role of solar energyas a potential contributor to economic diversification in Oman and concluded that it can have a positive impact in this regard. Although some research studies were conducted related to sustainable development highlighting the importance of environmental sustainability in Oman, they focused on the examination of general knowledge and awareness on environmental issues. Gaps in research revealed that there are still some misconceptions and lack of knowledge, attitudes and practices on environmental sustainability.

Thus, this study investigated the knowledge, attitudes and practices toward environmental sustainability among Omani college students.

2. Methodology

2.1 Research Design

This study is quantitative descriptive-factorial research. This study used a quantitative approach. It employed descriptive statistics and exploratory factor analysis (EFA) to analyze the data collected. A total of 171 Omani college students participated in the study at Bayan College, Oman. The target participants were from first year to fourth year college levels. It utilized a 15-item Likert scale self-made questionnaire to assess Omani college students' knowledge, attitudes and practices towards environmental sustainability (KAPSE) adapted from Salas-Zapata, Ríos-Osorio, and Cardona-Arias, (2018). It used SPSS version 26 for statistical data analysis. This new instrument KAPSE is developed by the researchers to measure the specific-construct for environmental sustainability among college students. The researchers administered the online survey through google form. The participants of the study were given the google form link with informed consent prior to answering the online survey instrument. It utilized a simple random sampling technique. KAPSE scale employed a five-point Likert scale, 1-strongly disagree, 2- disagree, 3-neutral, 4-agree and 5-strongly agree to measure students' KAPSE levels. In other words, the new instrument is validated to measure the KAPSE as a specific construct.

2.2 Developing the KAPSE Instrument

KAPSE is a 15-item Likert scale developed by the researchers. The pattern,

modification, and development of the new instrument emphasized the KAP model for environmental sustainability in education based on the study of Salas-Zapata, Ríos-Osorio and Cardona-Arias (2018). However, this study set the parameter in measuring KAPSE among Omani college students in Muscat, Oman.

KAPSE has undergone five (5) stages of development: 1) modification based on KAP model through a 15-item Likert Scale, 2) content validity from experts, 3) approval from research office to conduct and administer online survey questionnaire KAPSE among 171 Omani college students, 4) use of SPSS statistical analysis on scale reliability test and, 5) validity of exploratory factorial analysis.

3. Results

In Figure 1, results of the mean scores revealed that item 2 got the lowest mean score of 2.865, *SD*= 1.062 (low level) "*I know programs, projects and/or organizations working on environmental issues in my community*." Item 14 also got the lowest mean score of 2.865, *SD*= 1.193 (low level) "*I segregate or sort garbage according to recycling types.*" On the other hand, item 11 got the highest mean score of 4. 041 (high level) "*I turn off the lights and the faucets when not in use to save energy*." Results of descriptive statistics confirmed the findings of Hai, et al. (2010) that students have a low level of knowledge about environmental protection and health, including low inclination to participate in programmes and low participation in environmental and health activities. On the other hand, relevant tothe findings of this study on Omani students' high level of energy conservation, Kioko and Kiringe (2010) confirmed that although students have little knowledge of conservation, they have excellent attitudes on conservation and high participation in conservation activities. Cardwell (2011) corroborated in his study that adults have high participation in energyconsumption reduction.

Figure 1: Item Statistics

	Mean	Std. Deviation	Interpretation
1. I know and understand the concepts of climate change and green economy	3.0292	1.11369	Moderate

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2. I know programs, projects and/or organizations working on environmental issues in my community.	2.8655	1.06248	Low
3. I know about any environmental action in my college/ university.	2.8947	1.22740	Low
4. I know that recycling practices reduce climate change and save energy.	3.8480	1.34174	Moderate
5. I know that low carbon development strategies can reduce the impact of climate change.	3.4444	1.29302	Moderate
6. I like to participate in environmental projects in college/ university.	3.2222	1.28694	Moderate
7. I appreciate the promotion of a sustainable campus program in the college/ university.	3.4444	1.24197	Moderate
8. I am interested in learning more about climate change and development strategies.	3.2690	1.27331	Moderate
9. I appreciate the government's implementation of a green economy for environmental sustainability.	3.6491	1.21012	Moderate
10. I support the government's policies to reinforce the sustainable use of energy.	3.7485	1.16868	Moderate
11. I turn off the lights and the faucets when not in use to save energy.	4.0409	1.21441	High
12. I use eco-friendly shopping bags and avoid the use of plastics.	3.2281	1.27903	Moderate
13. I use public transportation or the bicycle.	3.2339	1.44435	Moderate
14. I segregate or sort garbage according to recycling types.	2.8655	1.19289	Low
15. I practice the 4R (refuse, reduce, reuse, recycle) for environmental protection and sustainability.	3.3860	1.14411	Moderate

*Legend: 4.5 - 5 = Very High level

4.0 - 4.49 = High level

3.0 - 3. 99 = Moderate level

2.0 - 2.99 = Low level

0 - 1.99 = Very low anxiety level

The results of the KAPSE Scale for Chronbach's Alpha revealed that the internal consistency reliability is α = 0.83. This implies that the KAPSE scale is internally consistent and highly reliable. Croasmun & Ostrom (2011) recommended an internally consistent scale is reliable with coefficient α = 0.70. Hence, this implies that adaptation of the KAPSE scale is highly reliable in measuring students' knowledge, attitudes and practices toward environmental sustainability.

As shown in Figure 2, the results of the reliability analysis for Cronbach's Alpha if item deleted revealed a range of highly acceptable internal consistency with a total range α =.816 - .838. In other words, these results implied that all items in the KAPSE scale are internally consistent and highly reliable. Thus, no items will be removed from the scale as it passed the reliability test.

Figure 2: Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
VAR00001	47.1404	95.286	.319	.234	.832
VAR00002	47.3041	94.495	.380	.325	.829
VAR00003	47.2749	93.683	.349	.249	.831
VAR00004	46.3216	87.255	.575	.494	.816
VAR00005	46.7251	89.353	.509	.378	.821
VAR00006	46.9474	90.791	.449	.321	.825
VAR00007	46.7251	90.024	.505	.418	.821
VAR00008	46.9006	90.384	.474	.334	.823
VAR00009	46.5205	89.475	.547	.442	.819
VAR00010	46.4211	88.928	.598	.457	.816
VAR00011	46.1287	89.701	.534	.444	.819

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VAR00012	46.9415	90.138	.482	.362	.823
VAR00013	46.9357	93.931	.266	.211	.838
VAR00014	47.3041	94.919	.307	.268	.833
VAR00015	46.7836	89.688	.576	.427	.817

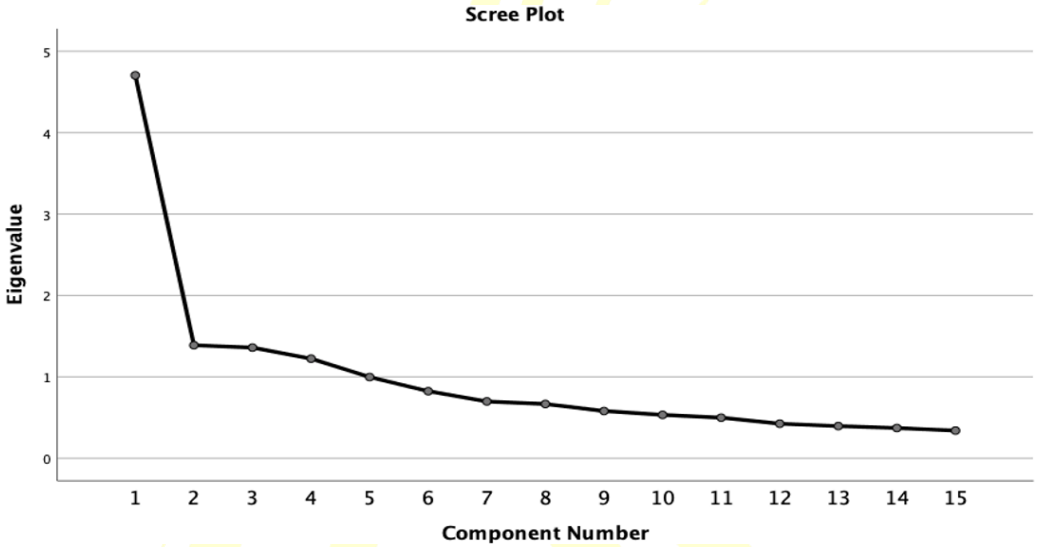

Figure 3

Figure 4: Rotated Component Matrix[a]

	Component			
	1	2	3	4
VAR00001			.615	
VAR00002			.785	
VAR00003			.586	
VAR00004	.772			
VAR00005	.701			
VAR00006		.630		
VAR00007	.580			
VAR00008		.585		
VAR00009	.648			

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VAR00010	.606			
VAR00011	.693			
VAR00012		.556		
VAR00013				.787
VAR00014		.706		
VAR00015		.533		.473

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in 7 iterations.

As shown in Figure 4, factor analysis was utilized by the researchers to establish the construct validity of the KAPSE scale. According to Thompson, B. (2004), factor analysis reduces a large number of variables into smaller sets of variables or factors, establishes underlying dimensions, allows refinement of theory and provides construct validity evidence. This study revealed four (4) factor loadings based on the *Extraction Method: Principal Component Analysis, Rotation Method: Varimax with Kaiser Normalization*, with rotation converged in 7 iterations. Overall, results of the factor analysis revealed an appreciable factorloading (= .473 up to the high factor loading = .785) construct validity. Items with <0.40 were removed to establish validity of factorial loadings.

Specifically, the first factor showed four (4) loaded appreciably within the range (.4−.6) out of 30 items and two (2) loaded with the highest loadings (>.7) which are indicative of a) recycling practices reduce climate change and save energy, low carbon development strategies can reduce the impact of climate change, promotion of a sustainable campusprogram in the college/ university, government's implementation of a green economy, government's policies to reinforce the sustainable use of energy for, individuals' practice of saving energy (items 4, 5, 7, 9, 10 and 11). Second factor showed four (4) loaded appreciably with (.4 − .6) and one (1) loaded with the highest loading (>.7) which are indicative of b) participation in environmental projects in college/ university**,** learning more about climate change and development strategies**,** use of eco-friendly shopping bags and avoidance of the

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use of plastics**,** segregate or sort garbage according to recycling types and the practice the 4R (refuse, reduce, reuse, recycle) for (items 6, 8, 7, 12, 14 and 15).

Third factor showed two (2) loaded appreciably with (.4 − .6) and one (1) loaded with the highest loading (>.7) which are indicative of c) understanding the concepts of climate change and green economy, knowing programs, projects and/or organizations working on environmental issues in my community, and knowing about any environmental action in my college/ university for (items 1, 2, 3). Lastly, fourth factor showed one (1) loaded appreciably with (.4 − .6) and one (1) loaded with the highest loading (>.7) which are indicative of c) use of public transportation and/ or bicycle, and practice the 4R (refuse, reduce, reuse, recycle)for environmental protection and sustainability.

4. Conclusion

This research study aimed at assessing Omani college students' knowledge, attitudes, and practices toward environmental sustainability. This study used a 15-item Likert scale developed by the researchers. Results of internal consistency revealed a reliable Cronbach's alpha= .834. Results of exploratory factorial analysis revealed four factor loadings for the KAPSE scale. Findings also revealed that Omani college students' knowledge, attitudes and practices are highly indicative of the following: a) knowledge of recycling practices reduce climate change and save energy**,** knowledge about low carbon development strategies can reduce the impact of climate change, practices on segregating or sorting garbage according to recycling types, knowledge of programs, projects and/or organizations working on environmental issues in my community, and the use public transportation or the bicycle. Results implied that even if Omani college students have high level of knowledge of recycling practices that reduce climate change and save energy**,** and moderate level of knowledge about low carbon development strategies that reduce the impact of climate change toward environmental sustainability, it does not necessarily follow that they have high level of environmental practices such as segregating or sorting garbage according to recycling types. Results of the study also implied that there is an urgent need to leverage strategic and coordinated mechanisms in higher education for the promotion and implementation of the programs, projects and/or organizations working on environmental issues in my community. Results also implied that there is a need to leverage strategic implementation and use of public transportation and/ or bicycles in Oman towards promotion of a green economy. This implied that environmental

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governance could be mobilized and leveraged by multi-stakeholders for the welfare of Oman constituents.

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