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Research Article

Environmental Knowledge and Practices Among Students of Valley University of Science and Technology, Bushenyi, Uganda

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Abstract

Continuous environmental degradation has not only led to increased global warming but has also contributed to mortality rates as well as hindering economic progress. Unfortunately, there was a lack of literature on how educational institutions, especially those in Uganda and especially Valley University of Science and Technology, respond to issues of the environment interns of curricular and other general environmental education practices. Hence, this study investigated the knowledge and practices of environmental education among students, specifically those at Valley University of Science and Technology, Bushenyi, Southwestern Uganda. The study was quantitative and employed descriptive methods. A questionnaire on environmental education measured on a five Likert scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *not sure*, 4 = *agree*, and 5 = *strongly agree*) was designed and administered online through WhatsApp and feedback was received from 190 respondents. The responses indicated that all students knew what factors lead to environmental degradation (mean of men = 4.21, mean of women = 4.12). It was also found that both students (mean of men = 2.77, mean of women = 2.82) and Valley University of Science and Technology as an institution (mean of mean = 4.29, mean of women = 4.24) were environmentally responsive through their curriculum design, use of proper waste management methods, conduction of sensitization programs, and participating in tree planting programs. The level of knowledge and practices towards environmental sustainability among the respondents were found to be independent of students' gender ($p > .05$). It was thus recommended that related programs be designed to sensitize all people as they exist in their different communities by putting up posters, conducting talks and performing skits on environmental education. Since the results proved that all the educated are literate about environmental education, legislators and environmentalists can base on them to put in place strict laws and policies against environmental degradation.

Keywords: environment, education, practices, degradation, global warming

Introduction

As we progress through the 21st century, the global world has adversely continued to experience increased temperatures and extended dry sessions as a result of global warnings due to increased differences in the incoming solar radiation and infrared radiation back emitted to space, bringing about an imbalance in the earth's energy (Beaulieu et al., 2024). When the earth receives sunlight, reflective surfaces, clouds, the surface of oceans and atmospheric particles send back a fraction of it (about 30 %) into the atmosphere, and 70 % gets absorbed by air, land, and oceans. This leads to increased temperatures on the planet's surface and atmosphere. As the earth continuously heats up, part of the radiations given out are re-absorbed by water vapor, carbon dioxide, methane, and other atmospheric gases and are eventually radiated back to the earth's surface, resulting in global warming (Shahzad, 2017).

Life on earth has always been protected by the ozone layer in the stratosphere, which not only absorbs most of the ultraviolet radiation from the sun but also regulates the temperature by reducing the cooling rate on the Earth (Yu et al., 2021). The Ozone layer is majorly composed of three oxygen atoms (O_3) – oxygen atoms are generated from photosynthesis in plants and algae (Yu et al., 2021). The ozone layer is destroyed when there is a release of chemicals containing bromine and chlorine, such as chlorofluorocarbons, into the stratosphere, which causes a chemical reaction with the accumulated oxygen molecules (Ayoko & Ayoko, 2024). The ozone layer becomes depleted mostly due to human activity in the form of chemic production from industries, uncontrolled agriculture, deforestation, reclamation of water bodies, poor waste management practices, and mining, among others and this is what is referred to as environmental degradation (Turyahabwe et al., 2022). Environmental degradation has adversely impacted the well-being of all living things, especially humans, including prolonged droughts, famine, financial crisis, increased cancer, mental illness, involuntary abortions among women, respiratory problems, heart failure, strokes, and sight problems, among others (Singh, 2024). If these issues are not properly addressed, global climate change and heat-related excess mortality are expected to almost triple between 2030 and 2050 (Jacobsen et al., 2022).

Thus, in order to deal with challenges resulting from environmental degradation, it is vital that individuals possess the knowledge and necessary innovative problem-solving skills, as suggested by Yener and Kalipci (2007). Ayoko and Ayoko (2024) pointed out that knowledge possessed by many people about

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environmental education is still insufficient and that it is individuals who are either not aware or not conscious or don't care that continue to behave and act in a way that destroys the environment. In this regard, educational institutions whose central role is to provide knowledge, design relevant innovations, and generally provide solutions to intriguing problems stand to be questioned. According to Hnatyuk et al. (2024), education is considered a core aspect in the process of transforming society toward sustainable development, providing individuals with an exceptional opportunity to realize their concepts of society in practical life. It provides an in-depth understanding of the principles of sustainable development, as this understanding is the basis for individual and societal decision-making in regard to attaining an equitable, balanced, and economically sustainable environment.

It has been realized from the literature reviewed that there is a lack of information on how educational institutions are promoting environmental education, especially in Uganda as a country and at Valley University of Science and Technology as an educational institution. Therefore, this study aimed to examine environmental protection knowledge and practices among students at Valley University of Science and Technology located in Bushenyi district, universities in Southwestern Uganda.

Significance of the Study

It is believed that having knowledge of the environment and how best to protect it aids responsible existence. Educational institutions may use the findings of this study to identify curricular gaps, which can lead to curricular reviews. Policymakers may use this study as a base to put forward laws and policies regarding environmental protection. Future researchers may also use this study as a reference point.

Objectives

The following objectives guided the study:

1. To assess students' knowledge of the factors that lead to environmental degradation.
2. To determine the level of environmental responsiveness among students and Valley University of Science and Technology as an institution.
3. To analyze if students' gender affects their level of knowledge and practices towards environmental sustainability.

Methodology

This study took a quantitative approach, employing a descriptive research design. Descriptive designs, according to Ary et al. (2010), are concerned with conditions or relationships that exist between two or more variables. The study was conducted among in-service students at Valley University of Science and Technology – a private university in southwestern Uganda. These students come from various regions of Uganda as a country, making them a good sample. The population of the study comprised all registered in-service students (328) who were active on WhatsApp as of May 2024. During the period of data collection (May/June 2024), the in-service students had physically reported at the university for their academic work. Data was collected by sharing a Google form link consisting of the questionnaire on environmental degradation, mainly through WhatsApp, to all students. WhatsApp was chosen as a means of data collection since 98% of the students actively use it (based on the active members on the general in-service students' university WhatsApp group as compared to the total number of registered students per admissions office) and the university provides them with free Wi-Fi. This method made it cheap and convenient to collect the data. The instrument of data collection comprised 17 items, of which seven tested students' knowledge of factors that lead to environmental degradation, four checked institutional programs on practices against environmental degradation, and six assessed students' personal level of involvement in practices against environmental degradation. The instrument was measured on a 5-point Likert scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *not sure*, 4 = *agree*, and 5 = *strongly agree*). The researchers received responses from 12th May to 15th July, when no more responses were coming in. The total number of students who sent in their responses was 190 (109 men and 81 women). Those who never responded to the questionnaire were considered to not have consented to participate in the study.

The items of the instrument were formulated carefully based on the gaps identified during the literature review. The items were then presented to two independent research experts in the field of environment to help check whether the items were valid (clear and in line with the problem under investigation). They were required to indicate when an item was valid or not valid. Their responses were obtained and compared item by item. Their level of agreement on the validity of each item was compared by finding the ratio of the number of items rated as valid by both experts to the total number of items in the instrument and it yielded a value of .89 which rendered the instrument valid.

Additionally, a pilot study was carried out among 20 in-service students from another private university who were not part of the final study. Cronbach's alpha value was calculated using the Statistical Package for Social Scientists (SPSS) program and was obtained as .96. Since this value was above the minimum, according to Creswell (2014), it rendered the instrument reliable.

This study was ethically approved by the Valley University of Science and Technology Ethical Committee under reference number RE/2024/162g. Additionally, the aim of the study was clearly explained to the respondents before their participation and they were assured of confidentiality and anonymity of their responses. They were also informed that the information obtained could be published but without disclosing anyone's identity. Every participant was required to first sign a consent form before their participation.

Descriptive analysis in means and standard deviations was used to understand whether practices on environmental degradation were dependent on gender. Inferential statistics through the performance of the independent samples *t*-test assessed whether the differences between men and women as far as environmental degradation are concerned were statistically significant.

Results

After responses were obtained, they were entered into the computer using SPSS and presented in Table 1 and Table 2. From Table 1, it is noted that concerning students' knowledge of the factors that lead to environmental degradation, the men had a mean of 4.21 with a standard deviation of .46. In contrast, women had a mean of 4.12 with a standard deviation of .33. There was no big difference between the responses of men and women in terms of means. This means that both men and women agreed that they had knowledge of the various factors that contributed to environmental degradation.

The study also investigated whether educational institutions have in place programs that aim at protecting the environment. In response to this, men showed an average of 4.29 with a standard deviation of 0.76, while women had an average of 4.24 with a standard deviation of 0.73. These results, according to both men and women students, indicated that Valley University of Science and Technology has tried to incorporate environmental protection programs in their curriculum, has put in place clubs for students where they can learn about the environment and possible protection practices, and do organize workshops for students. In addition, the results show that waste bins and waste collection points are well-gazetted and demarcated for proper waste management.

Furthermore, the study analyzed students' personal involvement in practices against environmental degradation. Men had an average of 2.77 with a standard deviation of .72, while women showed an average of 2.82 with a standard deviation of .69. This means both men and women opposed the statements that they themselves contributed towards environmental degradation. They indicated that they were not involved in the damping of wastes in inappropriate places and rather indicated that they do involve themselves in tree planting as a way of protecting the environmental cover and that they do sensitize each other on how best to protect the environment.

Table 1
Descriptive Statistics between Men and Women How on the Knowledge and Practices Against Environmental Degradation

Item	Men (n = 109)			Women (n = 81)		
	M	*SD*	SEM	*M*	*SD*	SEM
Knowledge of factors that lead to environmental degradation						
Poor waste management degrades the environment	4.19	.42	.04	4.11	.32	.04
Deforestation degrades the environment	4.28	.45	.04	4.09	.28	.03
Swamp reclamation degrades the environment	4.17	.41	.04	4.09	.39	.04
Water pollution degrades the environment	4.19	.46	.04	4.10	.30	.03
Air pollution degrades the environment	4.19	.52	.05	4.10	.30	.03
Soil exhaustion degrades the environment	4.25	.43	.04	4.20	.40	.05
Land fragmentation degrades the environment	4.17	.50	.05	4.12	.33	.04
Average	4.21	.46	.04	4.12	.33	.04
Institutional practices on environmental sustainability						
Our curriculum at the university contains units concerning the environment and how it can be protected	4.17	.69	.07	4.21	.75	.08
The university organizes workshops or seminars concerning the environment and how it can be protected	4.26	.98	.09	4.25	.97	.11
There are clubs or associations here at university that sensitize its members about the environment and how it can be protected	4.35	.88	.08	4.07	.67	.07
At the University, containers, and sites for waste disposal are provided	4.39	.51	.05	4.46	.53	.06
Average	4.29	.76	.07	4.24	.73	.08
Students' personal practices towards environmental sustainability						
I usually dispose of the waste in any place I find other than the 9azette areas	2.15	.90	.09	2.11	.79	.09
Sometimes, I burn the wastes	2.71	1.13	.11	2.73	1.16	.13
Some of the waste, I dispose of them in water bodies	1.94	.53	.05	2.06	.58	.06
I have used some of the swamp areas for farming	2.01	.22	.02	2.07	.54	.06
I have been sensitizing my colleagues on how to properly protect the environment	3.98	.65	.06	3.94	.56	.06
I have participated in tree planting wherever I go	3.82	.88	.09	4.01	.49	.05
Average	2.77	.72	.07	2.82	.69	.08

Note. N = 190.
SEM = standard error mean.

The study further analyzed whether the difference in responses of men and women varied significantly by computing an independent samples t-test (Table 2). Across all the three areas analyzed in the study: students' knowledge of the factors that lead to environmental degradation, institutional practices against environmental degradation, and students' personal practices against environmental degradation, the t-test indicated that the difference in the responses given by men and women were not statistically significant ($p > .05$). This could be related to the fact that environmental education programs organized in institution target all students irrespective of their gender. Thus, when it comes to protecting the environment, both men and women ought to take equal responsibility.

Table 2
Independent Samples t-test

Item	Levene's test for equality of variances		*t*-test for equality of means						
	F	*p*	*t*	*df*	*p* (2-tailed)	MD	SED	95% CI	
								LL	*UL*
Students' knowledge of the factors that lead to environmental degradation									
Equal variances assumed	16.70	.02	1.54	188.00	.21	.09	.06	-.03	.21
Equal variances not assumed			1.62	182.15	.20	.09	.06	-.02	.20
Institutional practices against environmental degradation									
Equal variances assumed	5.08	.34	.26	188.00	.49	.042	.11	-.17	.26
Equal variances not assumed			.29	173.36	.50	.04	.11	-.17	.26
Students' personal practices towards environmental sustainability									
Equal variances assumed	5.72	.41	-.64	188.00	.46	-.05	.10	-.26	.15
Equal variances not assumed			-.64	162.54	.46	-.05	.10	-.26	.15

Note. CI = confidence intervals; *LL* = lower limit; *UL* = upper limit, MD = mean defference, SED = standard error difference.

Discussion

From the study findings in Table 1, it was observed that students generally have knowledge of what factors contribute to environmental degradation. In agreement with this finding, Jamaludin et al. 2023) conducted a study on 'Environmental Protection Awareness and Practices of University College of MAIWP International (UCMI) Students' and their results indicated that college students were highly knowledgeable about environmental protection, but their level of environmental protection practices was a weak positive though statistically significant.

Additionally, the university was found to have some practices that fostered knowledge and practice of environmental sustainability through their curriculum and having clubs and workshops in place. Institutions also considered waste management as a key practice as they were reported to be providing containers and gazetting some places for proper waste disposal. Importantly, it was noted that students, on a personal level, engaged themselves in practices that protect the environment. In relation to the findings of this study, Minja (2022) assessed the integration of environmental programs in institutions and found that students doing social sciences were learning some content related to the environment, and the institution was even organizing workshops to train both student and teachers in issues of the environment. In the same study, they rated the availability of waste bins at mean = 3.11 with a standard deviation of .535, which indicated that the institutions were providing containers for the collection of waste. In regard to this, a study by Eustance et al. (2022) found a moderately positive relationship between environmental literacy and the practice of environmental sustainability.

Concerning students' individual practices towards environmental sustainability, they agreed that they do sensitize each other on related information and also do participate in planting of trees. They, however disagreed with the statement that they dispose of waste in any place, including waste burning. In a study by Hnatyuk et al. (2024), it was established that students who actively participate in academic education exhibit high engagement levels in environmental initiatives such as volunteering, event participation, and recycling, along with a keen interest in green technologies and alternative energy sources.

The knowledge and practices in this current study were found to equally cut across both men and women since the difference in their responses was statistically non-significant (Table 2). This indifference could be due to the fact all students, whether men or women are equally exposed to the same environmental education programs within the university. According to Jamaludin et al. (2023), in their study about 'Environmental Awareness and Practices among College Students, it was discovered that both males and females were equally knowledgeable about environmental protection. This was related to equal exposure to awareness programs organized at the institution. These results were confirmed by Hutchinsonah (2014) that since all students attend the same programs in school without gender discrimination, they are expected to actually be at the same level of knowledge possession of environmental issues. It is thus important that educational institutions incorporate within their curriculum environmental education as a way to enhance knowledge, attitudes, skills, and practices towards environmental sustainability (Wandera et al., 2022).

Conclusion

In this study, it was concluded that all students possess knowledge of factors that degrade the environment. The university as an institution, as well as students as individuals, were found to practice various methods that contribute to environmental sustainability (Table 1). In some cases, there were formal activities that enhanced knowledge of environmental sustainability. Also, students' environmental knowledge and practices were found to be independent of gender (Tabe 2), meaning that all humanity is equally responsible for protecting the environment.

Recommendations

Based on the study findings, it is recommended that in order to emphasize environmental education, institutions can form students' clubs about environmental education, prepare posters about the effects of environmental degradation and ways of protecting the environment and hang them all around the compounds and notice boards of institutions as a way of continuously sensitizing people. Institutions can additionally carry out talks and perform skits in churches and other community places so that everyone is educated about the environment.

Since this study was conducted at only one institution, similar studies can be conducted at other institutions and compare their findings to those in this study.

The Ministry of Education can, based on this study, propose that the curricula of every institutional program should reflect an element of environmental education. The government can also emphasize the policies against water body reclamation and forest preservation.

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