

Assessing the existing environment education for regular higher education: A gap analysis study

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Abstract. Raising public awareness of environmental issues is a crucial step toward ensuring a sustainable future for both human society and the environment. Universities, along with their students and graduates, play a vital role in this process. As Environmental Education (EE) is a critical subject in education that requires further investigation, this paper seeks to examine students' levels of knowledge, values, and environmental behaviors. It also aims to assess the role universities play in increasing students' environmental awareness. The study's population and sample consisted of full-time students at Ajloun National University, with 100 students randomly selected as the study sample. The results revealed that students demonstrated a high level of environmental awareness and held positive attitudes toward the environment. Furthermore, the findings highlighted the university's essential role in developing environmental knowledge, attitudes, and behavior. This was achieved through initiatives such as the inclusion of environmental education as an optional subject, the integration of environmental topics in compulsory course syllabi, and the provision of scientific activities. These activities included applied research projects, lecture series, documentary screenings, environmental day celebrations, exhibitions, nature visits, and seminars. These opportunities allowed students to explore solutions to various environmental problems in a practical setting.

1 Introduction

The importance of sustainable development goals has been announced by the UN to help better monitor the situation and to accelerate the realization of people's rights to raise their awareness and develop a sense of concern to acquire the skills for solving environmental problems [1]. Environmental education is key in shaping attitudes, behaviours, and policies toward sustainability and conservation, ultimately contributing to the well-being of both people and the planet [2,3]. Several works revealed that changes in environmental knowledge and affective indicators, such as what people believe to be important and their commitment to taking action, contributed to changes in knowledge, attitudes, and actions [4,5]. However, this will deliver knowledgeable, accountable, and engaged individuals with the skills and commitment to contribute to the creation of an environmentally sustainable future [6,7].

Environmental education has been the basis for promoting an understanding of Earth as an interconnected system, which encompasses an understanding of the natural and man-made environments [7]. Creating a link between knowledge and necessary action, aids in the development of problem-solving abilities for environmental issues.

Many researchers showed that global issues such as environmental problems and energy crisis affect each person on the earth [8-11]. They also stated that because

of environmental issues are now a global concern, environmental education is essential. Creating citizens who are conscious of and concerned about the environment and its relevant issues is the aim of environmental education.

Environmental education serves to instil in the general public the understanding necessary to make decisions that consider the environment and its circumstances.

Environmental education is crucial in fostering awareness, understanding, and action towards protecting and conserving our natural environment [12]. It encompasses many topics, including ecology, biodiversity, conservation, sustainability, climate change, pollution, and more. Environmental education can take various forms, including formal education in schools and universities, informal education at nature centres and museums, and advocacy efforts. To engage students and motivate them to take an active role in environmental stewardship, it frequently includes experiential learning, field trips, citizen science initiatives, and hands-on activities [13].

Universities should teach graduates and students who care about the environment because they play a significant role in fostering environmental knowledge, attitudes, and behavior. Universities must prioritize teaching environmental and sustainable environmental ideals. After graduation, university students are expected to become involved members of their

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communities and professions. One of their main responsibilities is to apply the knowledge, abilities, attitudes, and values they have gained from their university education to their personal and professional lives as well as other contexts. People who care about environmental sustainability and know how to stop environmental concerns should be educated [14]. Improving the environmental situation requires measuring and evaluating environmental awareness. A survey of the literature found that there were few studies measuring university students' environmental awareness in Jordanian contexts.

There are three components to environmental education: behavioural, affective, and cognitive. The goal of the cognitive component is to determine the degree to which educators inform and educate pupils about concerns about both active and passive environmental problems that society is facing. The affective component is linked to students' sentiments of respect, care, and admiration for environmental issues. Regarding the behavioral component, it speaks to students' readiness to act responsibly and support environmentally friendly solutions to local environmental issues that may be implemented through environmental practices [15]. For this reason, to achieve positive outcomes, the educational community, which includes parents, teachers, students, management, and society at large, must participate in this process.

This work aimed at shedding light on the importance of environmental awareness through curriculum and educational activities to promote sustainable practices and the main approaches to environmental education. In addition, it aims to identify the level of knowledge of Jordanian university students, their values concepts, and their behaviours towards the environment, and the contribution of higher education institutions toward raising environmental issues in their formal and informal educational programs and activities. The study is also designed to assess the current level of impact and results of efforts made by universities for the current and future environmental issues and their challenges on the student's knowledge and communities served and what actions are recommended to improve the current environmental education for better understanding of the environmental issues.

2 Problem Statement

Since people are the cause of environmental issues, they must also offer a solution. It is essential to educate people about sustainable development and the environment to address these problems. Because our world faces many environmental, political, and economic challenges and because every one of us as a human being has the right to a healthy, clean, and safe environment many people do not realize the extent of the environmental problems we face, or the connections between problems such as poverty and destruction of natural resources. The responsibility falls on us as human beings to reduce many challenges face such as pollution, poverty, poor housing and unemployment,

global hunger, rising levels of conflict, and displacement. This can be achieved through efforts and commitments from all parties towards the protection and conservation of our natural environment. To resolve such issues and challenges, people must be well informed of the issues and what can be done to resolve them. This sort of information is best taught through an interdisciplinary approach. The need for environmental education has never been greater. Environmental education should be incorporated into students' early education.

Education about the environment is applied knowledge. It needs to be reflected in students' behaviors because of its strong relationship to environmental issues and their lives. Because prevention is always preferable to treatment, it must be incorporated into all educational processes to help students develop the right environmental behaviors, knowledge, and attitudes. This work aims to address the student's level of knowledge, their values concepts, and environmental behaviors towards the environment, and the role of higher educational institutes in raising their students' awareness of the environment.

3 Methodology

The study is part of a project targeted at higher education institutions in Jordan and consists of two major approaches. The first approach included in this study targeted students at Jordanian universities through a pre-designed virtual survey structured in Google Forms. The questionnaire was conducted in May 2024 and consisted of Likert-type items with five points ranging from 1 (never) to 5 (always) to evaluate the cognitive aspects, effective aspects, and behavioural aspects of environmental education [15]. The population and sample of the study consisted of full-time students at Ajloun National University. Thus 100 students were chosen randomly to constitute the sample for the study.

The second approach uses FGD for academic administration, professors, and teachers to measure the formal and informal learning environment and activities. The descriptive analysis has been carried out through the use of figures by use of Excel. Reliability testing of the questionnaire has been performed for the three domains by use of Cronbach's alpha coefficient for assessing each dimension's internal consistency. Higher values indicated a more reliable and consistent questionnaire and the ranges above 0.9 thought to be extremely credible and between 0.8 and 0.9 to be credible. However, values of alpha below 0.6 are seen to be untrustworthy. The Cronbach's alpha coefficient has been examined by using an Excel spreadsheet. Results revealed that the knowledge, emotional, and behavioral dimensions respective Cronbach's alpha coefficients were 0.72 (>0.7), 0.93 (>0.9), 0.95 (>0.9). These values suggested that the variables have strong consistency and dependability. Inferential results are obtained using the Pearson correlation coefficient with a high level of significance (<0.05). Information about the

purpose and nature of the study is provided to students during the survey and guarantees the anonymous and voluntary nature of their participation at all times. The participants have been informed about the goals and the nature of the questionnaires

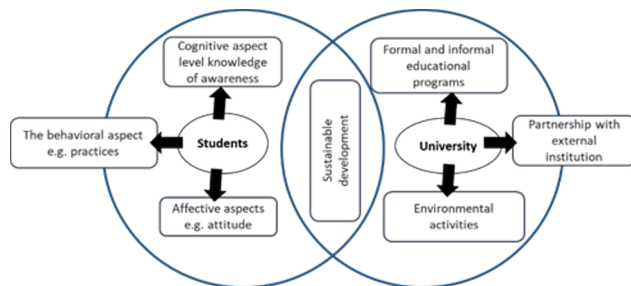


Fig. 1. Approaches used for investigating the actions taken by Jordanian universities and environment education on students' level of knowledge to reach sustainable development

To investigate the students' level of knowledge, and their attitudes towards the environment, the researchers adopted the attitudinal questionnaire (items 1-21) from [16]. To investigate the students' environmental behaviors and practices, the researchers chose items 22-55 from [17]. Experts in the fields of science education and SD/ESD were consulted by the researchers to assess the instrument's content validity and determine whether each item was appropriate for the respective scale. Their feedback was taken into consideration when reviewing the final instrument. To perform a pilot study, the researchers selected 100 undergraduate students from ANU who were not part of the main study population. Each scale and the entire instrument's internal consistency reliability coefficient (alpha) were determined. The knowledge scale's alpha coefficient was 0.76, the attitude scale's was 0.85, the behavior scale's was 0.78, and the instrument's overall alpha coefficient was 0.82. These standards are appropriate.

In addition, to gain a better understanding of the role of academic administration, professors, and teachers in measuring the formal and informal environment of learning towards raising their students' awareness of the environment, A questionnaire was developed. The instrument was given to twenty (10) lecturers to evaluate its reliability using the test-retest procedure. A (0.82) correlation coefficient was obtained. This was deemed sufficient for the research. Along with two qualified research assistants, the researchers personally distributed the questionnaires. After that, a face-to-face approach was used to ensure that the responder had completed the questionnaire correctly. To find the degree of acceptance, the researcher used the following Questionnaire Correcting

Table 1. The Questionnaire Correcting Method

1. Low	1	2.33
2. Moderate	2.34	3.66
3. High	3.67	5

4 Results and Discussion

4.1 Findings related to the first research question

The first question of the study was: What are the students' level of knowledge, their environmental behaviors and attitudes towards the environment? To answer the first question of the study, means and standard deviations of students' level of knowledge, their environmental behaviors and attitudes towards the environment were computed as presented in tables 2.

Table 2. Means and standard deviations of students' level of knowledge, their environmental behaviors and attitudes towards the environment

	Item	Mean	Std. Deviation
Cognitive aspects (level of knowledge domain)			
1	An interaction of plants, animals and microorganisms with their non- living components is referred to as ecosystem	3.34	0.62
2	Environmental education helps learners learn skills on how to destroy the environment	3.64	0.54
3	The human disturbance of the natural environment leads to environmental degradation	3.38	0.69
4	Environmental Education should only focus on present environmental situations	2.55	0.84
	Conservation of nature helps to protect the environment from loss, waste and harm	3.68	0.58
6	All buildings, monuments , Roadways make up the natural environment	2.83	0.92
7	Sustainable development is meeting the needs of only present generation	2.56	0.92
8	Gradual increase in the earth temperature is known as global warming	3.32	0.57
9	Environment is composed of only man and animals	1.84	0.93
Total		3.02	0.73

	Item	Mean	Std. Deviation
Affective aspects(Attitude domain)			
11	Environmental Education has increased my love and appreciation for nature	3.43	0.57
12	Environmental Education helps to produce active and well informed individuals	3.48	0.60
13	Despite our special abilities, humans are still subject to the laws of nature	3.20	0.74
14	Environmental Education gives me an edge over other colleagues in different course areas	3.27	0.60
15	Environmental Education helps to produce effective and well prepared workforce	3.34	0.59
16	Humans have the right to modify the natural environment to suit their needs	3.06	0.85
17	Plants and animals have as much right as humans to exist	3.56	0.63
18	Humans are severely abusing the environment	3.42	0.73
19	If things continue on their present course, we will soon experience a major ecological catastrophe	3.33	0.65
20	The earth has plenty of natural resources if we just learn to develop them	3.58	0.61
21	The balance of nature is strong enough to cope with the impacts of modern industrial nations	2.78	0.84
Total		3.3	0.67

	Item	Mean	Std. Deviation
Behavioral aspects (practice domain)			
22	I choose to walk to places instead of using a motor vehicle	3.34	0.77
23	I pick up litter when I see it in a park or a natural area	3.56	0.65
24	I volunteer to work with local environmental groups	3.40	0.66
25	I have thought quite a bit about how to live sustainably	3.15	0.61
26	I take my own paper sacks (or other containers) to the grocery store	3.00	0.80
27	I avoid purchasing things in plastic containers	3.01	0.79

28	I grow some of my own food	3.17	0.80
29	I purchase food in bulk quantities and containers	2.33	0.76
30	I read the labels before buying foodstuffs	3.32	0.72
31	I do not eat at fast-food restaurants	2.79	0.84
32	I eat food grown locally and in season	3.32	0.63
33	I avoid snacks and other foodstuffs with lots of packaging	3.18	0.69
34	I turn off electric lights and appliances when no one is in the room	3.62	0.60
35	I decide what I want from a refrigerator before opening it	3.14	0.75
36	I turn off the water heater when leaving my house	3.43	0.73
37	I avoid using nonessential electrical appliances (can opener, toothbrush, coffee maker, hair dryer, shaver, etc...)	3.27	0.77
38	I avoid washing clothes before they really need it	2.86	0.90
39	I use pesticides	3.05	0.74
40	I avoid using plastics of all kinds	2.77	0.83
41	I avoid purchasing a daily newspaper	2.77	0.83
42	I share things with my neighbors	2.96	0.78
43	I never overuse water	3.43	0.69
44	I turn off the water when brushing my teeth or shaving	3.49	0.56
45	I am a recyclable person	3.43	0.64
46	I do not throw away items which could be repaired or reused	3.21	0.78
47	I give unnecessary clothing and furnishings to charity	3.46	0.59
48	I reuse plastic and paper bags	3.15	0.68
49	I visit or take a walk in a natural area each week	3.30	0.58
50	I share my love of nature with other	3.40	0.64
51	I never purchase products made from wild	3.03	0.87
Subtotal		3.17	0.72
Total		3.16	0.71

Table 2 shows that the overall degree of the students' level of knowledge, environmental behaviors

and attitudes towards the environment is moderate as the mean is 3.16. The table also shows that the means of the students' responses to each dimension in the questionnaire range between 3.02 and 3.3 with standard deviations that range between 0.73 and 0.67. This result highlights the importance of environmental education in fostering awareness, understanding, and action towards the protection and conservation of our natural environment. This result indicates that students are highly interested in the importance of these principles that should be taken into account in the environmental education process. Students show a consensus toward 'agree' and 'strongly agree'. Therefore, they have a high awareness, attitudes and behaviors of the various principles that form the core of an approach to environmental education. Based on the results of the question, they pointed out that nearly most of the students confirmed that those principles are essential aspects and factors to create and build a rich and meaningful ecological and environmental knowledge.

The results revealed that the level of students' knowledge, attitudes and their practices towards the environment are sufficient and partly positive. This has appeared in 96% of participants' responses regarding environmental conservation and ecosystem identification. 96% of the responses indicated the role of environmental education in conserving the environment and 89% of these responses recognized the role of human perturbation on ecosystem deterioration. The responses directed to the future focus on the environmental education of the current and future environmental topics to cover all levels of knowledge and backgrounds of students to deliver sufficient information to future generations of avoiding and mitigating future environmental problems. There has been a misunderstanding of how the natural environment is formed and defined. The responses have no consensus about the natural environment identification. The role of sustainable development on the current and future generations' needs was identified as 49% of the responses disagreed with the role of sustainable development on future generations. More focus is needed for covering topics regarding sustainable development in university programs, activities, and other learning strategies. 95% of the responses have identified the gradual temperature increase of the atmosphere by global warming and most responses were able to differentiate between ecosystem component. Therefore, these basic elements of environmental education help individuals understand and appreciate the environment in all its complexity. Because the natural environment is incredibly complex, with many connections and interactions between the living and nonliving components of the world, it must be understood so that people can begin to understand the consequences of their actions on the environment. Understanding environmental issues can only serve the future.

4.2 Results of the second questions

The second question asks about the role of universities in raising their students' awareness of the environment.

To gain a better understanding of the role of academic administration, professors, and lecturers in measuring the formal and informal environment of learning towards raising their students' awareness of the environment, the participants were asked specific questions and their answers were analyzed.

Results show the means of students' responses to each dimension in the questionnaire ranging between 1.92 and

2.05 with standard deviations that range between 0.08 and 0.10. The averages of student responses towards the university's role in developing environmental awareness among students were moderate. Results indicated that universities must have the potential to contribute to the crucial promotion of the adoption and implementation of initiatives relating to environmental education. The formal and informal environmental education programs should be provided by the university through tutorials, webinars, series, and media-based information, the existing teaching programs or activities for environmental awareness such as applied research projects, lecture series, documentary shows a celebration of environmental days, exhibitions, nature visits, nature clubs, seminars, and conferences.

The responses to the questionnaire in its various fields indicated that the university's role in developing environmental awareness among its students is moderate. This may be due to factors including the presence of only two optional curricula entitled Environmental Education and Sports and Health for some faculties but not others, and perhaps relying on the judgments of some faculty members in exposure to environmental issues in an indirect and unplanned way. In addition to the lack of references in libraries in the field of the environment, the severe shortage of trips and visits to some beautiful places and sites, in addition to the scarcity of tasks that focus on various types.

Table 3. A questionnaire on the university's role in developing environmental awareness

The role of curriculum				
No	Items	Mean	STDEV	Agreement Degree
1	The university helps me learn about the concept of the environment and the integration of its components through academic courses	0.80		Medium
2	Many university courses contain several topics that address environmental issues	0.73		Medium

3	There are Courses called Health and Sports, and Environmental Education that include knowledge and attitudes that develop environmental awareness among students	0.94	High
4	The curriculum is updated regularly to keep pace with environmental developments	0.86	High
5	The curriculums fill the need of each student to learn how to solve real-world situations, to share their ideas, and to confront them with teachers' opinions and experience	0.74	Medium
Total Means		2.04	0.078 Medium
<i>The role of lecturers</i>			
No	Items	Mean	STDEV Agreement Degree
1	The lecturers raise awareness of some environmental risks through discussions and dialogue	1.88	0.69 Medium
2	The lecturers explain the Importance of the regulations and laws in the field of environmental protection	2.03	0.92 Medium
3	The lecturers explain the students' role in preserving the environment And protecting its resources.	1.83	0.81 low
4	The lecturers participate in Cleaning and planting campaigns.	1.95	0.75 Medium

5	The faculty member directs students to write topics and reports on the dangers of burning garbage and its Consequences damage to it	1.93	0.76 Medium
Total Means		1.92	0.08 Medium
<i>Students' activities</i>			
No	Items	Mean	STDEV Agreement Degree
1	The university holds many seminars and meetings to identify and advance environmental issues and problems	1.90	0.93 Medium
2	The university organizes scientific competitions among students to develop environmental awareness	2.15	0.83 High
3	There are periodic environmental bulletins in faculties that provide students with news about the environment	1.90	0.78 Medium
4	The university encourages students to participate in National and international environmental events	2.28	1.01 High
Total Means		2.05	0.10 High

5 Conclusion

Environmental policies are being formed globally as a result of the significant increase in public awareness of the detrimental effects of human activity on the environment. Individuals are becoming more conscious of how their daily actions affect the environment and, concurrently, how those actions affect how their local community is managed. People must be aware and educated about the importance of preserving the environmental system so that they can adopt a more responsible attitude and promote critical thinking, communication, and problem-solving skills towards the environment. Therefore, if properly implemented in educational institutions, environmental education that encourages such transformation will allow students to have a greater voice on environmental issues. Environmental education is fundamental to addressing environmental and resource sustainability by creating environmentally literate citizens. As there is a direct

link between environmental education and pro-environmental behavior among regular university students, this link will sustain human-nature interaction in the long term. Existing formal and non-formal environmental education must be regularly updated with many current activities within the target universities and this may require identifying the most important topics to be included in the curriculum. Teachers can fully develop environmental topics by involving practical aspects in the materials presented to students for a better understanding of environmental problems. More research is needed to better understand the gaps in current environmental education within universities with a particular focus on topics related to environmental conservation and linking environmental learning outcomes with strategic plans of universities toward the environment with regular updating of curriculums.

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