



Environmental Literacy, Interest and Engagement in Environmental Activities: A Shared Understanding for Undergraduates

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Authors' contributions

This work was carried out in collaboration between both authors. Author KMVS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author GK managed the data collection. Both authors read and approved the final manuscript.

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ABSTRACT

Purpose: The study aims to examine the extent of environmental literacy, interest in environmental issues and engagement of environmental activities of the undergraduates in Sri Lanka believing that understanding the level of environmental literacy will lead to influence attitudinal changes and actions of undergraduates towards the environment.

Design: A self-administered structured questionnaire was utilised to collect data from Bachelor of Commerce undergraduates in state universities of Sri Lanka. The descriptive analysis and the multiple regression analysis were used to examine the extend and the relationship among the constructs.

Findings: Based on the descriptive analysis, there was low level of environmental literacy among the selected undergraduates in this study. The overall level of interest in environmental issues and level of engagement in environmental activities were moderate. The multiple regression analysis indicated that environmental literacy, as well as environmental interest, were significant predictors for environmental engagement.

Originality and Implications: The results facilitate to recommend that B.Com degree programme should be integrated with environmental areas where such knowledge could lead to promote interest and action towards the environmental activities.

Keywords: Sustainability; comparative study; bachelor of commerce undergraduates.

1. INTRODUCTION

Behavioural approaches highlight that the more opportunities to enhance knowledge, the easier it is to change behaviour [1]. Hence, awareness of environmental issues and the actions taken to protect environment are essential for every individual, corporation and society. To protect and retain a sustainable environment, there is the need to have adequate knowledge about the environment [2]. In line with that, Roth [3] indicated that it is essential to have a healthy and productive environment in order to achieve sustainable human events.

The knowledge level and interest in environmental issues are decisive to engage in environmental protection functions [4,5,6,2]. Accordingly, in order to achieve a sustainable environment education is a key factor and therefore, environmental literacy level of the society needs to be upgraded [7]. Concerning the education, undergraduates are key category to take a critical approach to provide appropriate knowledge in environmental issues.

The higher education institutes are progressively recognising that they have a vital role to play with regarding the environmental issues [8]. This is the reason why universities are referred as change agents that need to develop curriculum to enhance undergraduates' knowledge and skills on sustainability [5,9]. Acknowledging these arguments, Arnon [10] indicated that dynamic business world supposes to educate students on environmental issues and sustainability hence, the higher education institutions play key role to cultivate the environmental literacy of undergraduates.

There is a significant lack of published research on higher education institutes [11,2] especially in developing nations context. According to Kaplowitz [11], the prior studies have been mostly focused on secondary schools. Hence, there is still an opportunity to research on the level of environmental literacy of undergraduates. The present study aims to examine the extent of environmental literacy of management

undergraduates in Sri Lanka. The management undergraduates were specifically focused because they will be future managers and decision makers in working places [12,13,14]. The current curriculum of management degree programme in Sri Lanka consists with the major environmental areas of sustainability development, sustainability reporting, green economy, environmental law, eco-friendliness, green marketing, environmental management system and corporate social responsibilities. Since, environmental education is an interdisciplinary concept [3], environmental literacy can provide through different subject areas in management discipline. The universities, especially state universities, now highly concern to make their management graduates environmentally literate through degree programme curriculum. However, there is no enough published evidence on the assessment of environmental literacy level of management undergraduates in Sri Lanka. Thus, the study exposed the environmental literacy level believing that understanding the level of environmental literacy will lead to influence attitudinal changes and actions of management undergraduates towards the environment. Further, the findings of the study could influence to consider the environmental education curriculum intended to enhance the level of environmental literacy. As such, the main purposes of this study were to;

Examine the extent of environmental literacy of undergraduates with regards to general factors and industry related factors;

Examine the level of interest and engagement of environmental activities of undergraduates; and Identify the influence of environmental literacy and interest in environmental issues on environmental activity engagement.

2. LITERATURE REVIEW

2.1 Environmental Literacy

Roth [3, p.10] indicated that environmental literacy is the capacity to perceive and interpret

the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems. However, Stables [15] argued that it is not practical for all people to be educated about the environmental system, hence it is important to consider the influential roles and positions of students who are possible to play and occupy in society in future. Students, especially undergraduates, could be the key point of sustained change and action towards the environment. In line with that, the Sustainability Tracking, Assessment & Rating System (STARS) version 1.2, organized by the Association for the Advancement of Sustainability in Higher Education (AASHE), indicated that higher education institutions require to assess environmental literacy of student and sustainability learning outcomes need to be incorporated into degree programmes [16]. Based on the premise of Owusu [2], the study refers that environmental literacy as knowledge about and an attitude towards the environment and its associated issues.

Omran [17] emphasised that society expects higher education institutions to use suitable methods to attain sustainable development, growth in environmental education and institutionalize environmental knowledge, values and skills among its citizens. This calls for the examination of the level of environmental knowledge among undergraduates. As such, it is responsibility of education institutions to ensure the efficient and effective acquisition of knowledge and skills to perform economic activities in sustainable ways [18]. According to the STARS and Goldman [7], environmental education is vital to create an environmentally literate society.

Kaplowitz [11] examined the environmental literacy level of students of University of Michigan and revealed that there were low levels of knowledge among students. The study concluded that there was minimal success in environmental education efforts over the past three decades. Jóhannsdóttir [19] examined the environmental literacy level of MBA students at University of Iceland. The study found that MBA students have low levels of environmental literacy. In addition, Lillah [20] conducted a survey to assess the environmental literacy level of students at the Business and Economics

Faculty of the Nelson Mandela Metropolitan University. The result also indicated that environmental literacy level of business students is low and their literacy level is limited to a few aspects of environmental literacy. This is why Hoffman [21] complained that whilst environmental and sustainability issues have become essential parts in business world, business schools do not train their students to consider these issues as a key factor in business decision-making. Having said so, the finding of Kaplowitz [11] indicated that the business faculty and business students are among the lowest scoring faculties and least knowledgeable in environmental issues. In this regard, the present study aims to examine the environmental literacy level of management undergraduates in Sri Lanka. Further, the study examines how environmental literacy and interest in environmental issues influence environmental activity engagement of management undergraduates.

3. METHODOLOGY

3.1 Sample and Data

The scope of this study includes undergraduates who enrolled with management degree programmes in state universities in Sri Lanka. There are around 15,000 undergraduates following management degrees in 15 state universities, including several management degree programmes (Business Administration, Accounting and Finance, Human Resource Management, Marketing, Information Technology, Public Administration and Commerce). Among them, the study focused on the undergraduates enrolled on Bachelor of Commerce (B.Com) degree programme, since B.Com degree recognised as a multidisciplinary degree programme in business education. In total of 15 state universities, 5 universities are currently offering B.Com degree, counting 2500 undergraduates. Four universities were made their consent to participate the study. The study decided to assess the level of environmental literacy of Degree part III and IV undergraduate. Degree part I and II undergraduates were not included since they have not enough opportunity to experience the major environmental areas in their courses. Sample framework of the study is illustrated in Table 1.

Table 1. Sample framework of the study

Degree part	University				Total
	Sri Jayewardenepura (SJP)	Eastern (EST)	Kelaniya (KLN)	Peradeniya (PERA)	
Part III	120	48	100	52	320
Part IV	116	52	120	42	330
Total	236	100	220	94	650

3.1.1 Variables and measures

A self-administered structured questionnaire was utilised to collect data. The survey questionnaire comprised a total of 34 items, closely corresponds to the instrument used by Owusu [2], taking the cue from other studies [19,22].

The first part of the questionnaire included two categorical items which were used to solicit demographic information from the undergraduates namely gender and place of residence. The study aimed to find whether these key demographic factors influenced to the level of environmental literacy, interest and activity engagement of the undergraduates. The second part of the instrument used to examine the environmental literacy level of the respondents. The respondents were asked to rank their level of literacy among 20 environmental factors on a scale of 1 (very low) to 4 (very high). The 20 environmental factors consisted with 9 general factors (Global warming, Greenhouse gas emission, Global climate changes, Waste management practices, Renewable and non-renewable natural resources, Energy consumption, Water wastage and water sources preservation, Environmental public complaints, Biodiversity) and 11 industry related factors (Carbon footprint and carbon offset, Eco label, Emission trading, Environmental management system, Eco friendly production process, *Organic* agriculture, Environmental quality standards, Environmental accounting, Environmental audit,

Sustainable business, Corporate social responsibility). The final part explored the interest and activity engagement in the environmental activities of the respondents. The respondents were asked to indicate their level of agreement on 14 statement using itemised rating scale (four-point Likert-scale) with end points of strongly disagree and strongly agree. A total of 650 questionnaires were distributed to the desired sample during the second semester of the 2017 academic year (Refer Table 1). Representing 58 per cent response rate, 374 questionnaires were received. Out of total 374 questionnaires analysed, 244 were females (65.2 per cent), with the remaining 130 (54.8 per cent) being males.

3.2 Data Analysis

In order to assess the adequacy of the measurement items, individual-item reliability, construct reliability, discriminant validity and the issue with multicollinearity were tested. Independent sample t-test and One-Way ANOVA were employed to ascertain the differences in the level of environmental literacy, interest and activity engagement with respect to gender, academic level, university and place of residence of the undergraduates. The descriptive statistics were employed to examine the extent of knowledge of 20 identified factors on environmental literacy. The proposed model for the study (Fig. 1) was estimated using multiple regression analysis [23,24,25,26,27].

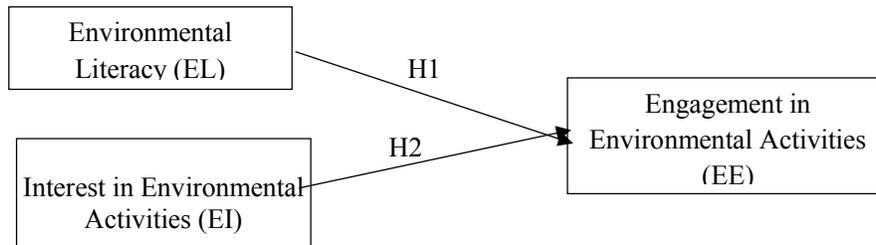


Fig. 1. Research framework

The framework proposed in this study is illustrated in Fig. 1. Accordingly, the study constructed the following hypotheses;

- H1: Environmental literacy influences the actual engagement in environmental activities of B.Com undergraduates in Sri Lanka
H2: Interest in environmental activities influences the actual engagement in environmental activities of B.Com undergraduates in Sri Lanka

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

The descriptive statistics on the extent of environmental literacy of undergraduates with regards to general factors and industry related factors, interest in environmental issues and engagement of environmental activities were provided in Table 2. As shown in Table 2, the three top indicators of general environmental literacy were water wastage and water sources preservation (mean = 2.86), global climate changes and energy consumption (mean = 2.75). The least recognised indicators were related to biodiversity (mean = 2.30) and greenhouse gas emission (mean = 2.35). Further, the three top indicators of industry related environmental literacy are corporate social responsibility (mean = 2.91), eco-friendly production process (mean = 2.64) and sustainable business (mean = 2.63). Emission trading (mean = 2.10) and environmental audit (mean = 2.20) were recorded as the least indicators. Generally, the overall mean value for the level of environmental literacy was 2.45, with a standard deviation of 0.38. Specifically, the overall mean value for the general environmental literacy and industry related environmental literacy were 2.62 and 2.40 respectively. As the result, there was low level of environmental literacy of the selected undergraduates in this study.

The respondents were mostly interested in methods of enhancing environmental sustainability and community services on environmental sustainability (mean = 3.20). The least environmental interest indicator was Participated public seminars relating to environmental issues (mean = 2.35). The overall mean value for the interest in environmental issues was 2.86, with standard deviation of 0.48. Thus, level of interest in environmental issues of the selected undergraduates was moderate.

Regarding the indicators of engagement in environmental activities, the top indicator was Reduce water wastage (mean = 3.31) and least was Member of environmental clubs / organisations (mean = 2.09). The overall mean value for this construct was 2.89, with standard deviation of 0.46. Thus, there was a moderate level of engagement in environmental activities of the selected undergraduates.

Additionally, to identify the existence of differences in the literacy levels, interest and engagement in environmental activities between gender, academic levels, universities and place of residences, Independent sample t-test and One-Way ANOVA were employed. The results were shown in T test p values in Table 2. Accordingly, the item of waste management practices showed significant difference in environmental literacy factor among males and females. There were two environmental interest indicators; Interest in community services on environmental sustainability and Interest in joining NGOs that deal in environmental sustainability, showed differences among males and females. Reduce water wastage, Reuse plastic and polyethene materials and Plant trees/vegetables recorded significant differences among males and females in environmental activity engagement indicators. The indicators that showed differences in gender basis, males undergraduates recorded the highest mean values.

The indicator of Corporate social responsibility showed the difference in environmental literacy among academic year III and IV undergraduates. Three environmental interest indicators namely Participated public seminars relating to environmental issues, Exchange views relating to environmental issues, Interest in joining NGOs that deal in environmental sustainability and Interest to study further on green economy, showed differences among third and final year undergraduates. For the engagement in environmental activities, there were no differences among third and final year undergraduates. The indicators that showed differences in academic level basis, final year undergraduates recorded the highest mean values. This might occur because final year undergraduates undertake industry related training for minimum 6 months. Hence, these results highlighted the importance of having the industrial experience to enhance the knowledge and practice of environmental protection activities.

Table 2. Descriptive statistics

Factor	Mean	SD	T test p value ^a	T test p value ^b	T test p value ^c	T test p value ^d
Environmental Literacy						
Global warming	2.70	.695	.475	.079	.000	.066
Greenhouse gas emission	2.35	.716	.944	.628	.419	.595
Global climate changes	2.75	.652	.825	.550	.010	.059
Waste management practices	2.66	.758	.001	.093	.746	.340
Renewable and non-renewable natural resources	2.63	.739	.807	.201	.213	.754
Energy consumption	2.75	.753	.776	.968	.075	.232
Water wastage and water sources preservation	2.86	.761	.918	.221	.081	.721
Environmental public complaints	2.55	.776	.059	.394	.000	.681
Biodiversity	2.30	.782	.374	.159	.380	.187
Carbon footprint and carbon offset	2.20	.827	.941	.885	.033	.599
Eco label	2.16	.756	.522	.370	.000	.439
Emission trading	2.10	.755	.175	.331	.674	.760
Environmental management system	2.45	.692	.912	.792	.753	.165
Eco friendly production process	2.64	.702	.104	.419	.824	.075
Organic agriculture	2.33	.741	.484	.521	.767	.094
Environmental quality standards	2.50	.720	.361	.575	.041	.560
Environmental accounting	2.28	.734	.474	.667	.113	.137
Environmental audit	2.20	.715	.955	.439	.991	.422
Sustainable business	2.63	.705	.507	.816	.169	.573
Corporate social responsibility	2.91	.753	.649	.016	.001	.445
Interest in environmental issues						
Interest in methods of enhancing environmental sustainability	3.20	.664	.226	.199	.003	.145
Interest in community services on environmental sustainability	3.20	.604	.019	.328	.008	.096
Participated public seminars relating to environmental issues	2.35	.847	.056	.005	.040	.261
Exchange views relating to environmental issues	2.71	.730	.268	.025	.497	.096
Interest in joining NGOs that deal in environmental sustainability	2.72	.898	.000	.013	.253	.261
Interest to study further on green economy	3.12	.748	.074	.016	.395	.096
Watch documentary movies relating to environmental issues on TV	2.77	.847	.569	.329	.028	.158
Engagement of environmental activities						
Use eco-friendly products	2.86	.688	.041	.711	.993	.347
Discourage burning of plastic and polyethene	3.08	.769	.037	.937	.345	.083
Reduce water wastage	3.31	.682	.000	.134	.599	.055
Read environmental articles in newspapers	2.85	.770	.069	.110	.065	.109
Reuse plastic and polyethene materials	2.99	.778	.002	.238	.232	.078
Plant trees/vegetables	3.07	.798	.000	.419	.089	.085
Member of environmental clubs / organisations	2.09	.859	.518	.119	.110	.154

Differences among males and females; ^b differences among academic levels; ^c differences among universities; ^d differences among place of residences

Further, there were seven environmental literacy indicators (Global warming, Global climate changes, Environmental public complaints, Carbon footprint and carbon offset, Eco label, Environmental quality standards and Corporate social responsibility), four environmental interest indicators (Interest in methods of enhancing environmental sustainability, Interest in community services on environmental sustainability, Participated public seminars relating to environmental issues and Watch documentary movies relating to environmental issues on TV) showed differences among selected universities. There was no significant difference in engagement in environmental activities among universities selected in this study. The indicators that showed significant differences in environmental literacy at university basis, Eastern University recorded the highest mean values for Global warming, Global climate changes and Eco label. Kelaniya University recorded the highest mean values for Environmental public complaints and Carbon footprint and carbon offset. The highest mean values for Environmental quality standards and Corporate social responsibility recorded for University of Sri Jayewardenepura. For the environmental interest indicators, Kelaniya University scored the highest mean values for Interest in methods of enhancing environmental sustainability, Interest in community services on environmental sustainability and Participated in

public seminars relating to environmental issues. The highest mean value for Watch documentary movies relating to environmental issues on TV was recorded in Eastern University.

Finally, in terms of place of residences of undergraduates, there was no significance difference in environment literacy, interest and engagement in environmental activities. This result ensures that residential background could not make significant influence on environmental factors of undergraduates.

In summary, Table 3 shows the comparative analysis of the mean values of environmental literacy levels, interest and engagement in environmental activities with respect to gender, academic year and selected universities. As shown in Table 3, relative to female, male undergraduates recorded the highest environmental literacy level in academic year III. However, this scenario is completely opposite in academic year IV. For the interest and engagement in environmental activities, females recorded the highest mean values in both academic years. These results indicated that female undergraduates play a significant role in making a healthy and productive environment. As such, it clearly emphasises the requirements of designing course specifications to attract male undergraduates in order to protect and retain sustainable environment. It could be executed

Table 3. Comparative summary

University	Environmental literacy level			
	Academic year III		Academic year IV (Final)	
	Male	Female	Male	Female
Sri Jayewardenepura	2.51	2.42	2.47	2.54
Kelaniya	2.49	2.47	2.49	2.60
Eastern	2.69	2.58	2.38	2.59
University	Interest in environmental activities			
	Academic year III		Academic year IV (Final)	
	Male	Female	Male	Female
Sri Jayewardenepura	2.73	2.95	2.69	2.71
Kelaniya	2.90	3.01	2.79	2.90
Eastern	2.82	3.08	2.77	2.92
University	Engagement in environmental activities			
	Academic year III		Academic year IV (Final)	
	Male	Female	Male	Female
Sri Jayewardenepura	2.66	2.99	2.90	2.82
Kelaniya	2.72	3.00	2.75	2.89
Eastern	2.66	3.12	2.77	3.07

through applying active-based teaching and assessment techniques in environmental related subject areas. Further, in the selected universities, literacy level and interest in environmental factors of undergraduates in academic year III were relatively higher than academic year IV (Table 3). However, engagement in environmental activities of year IV undergraduates, especially males, was higher than academic year III. Since undergraduates are engaging with internship in their final year, they enter the working environment and require to adhere the environmental regulations imposed by the organisations.

Further, the study intends to investigate the relationship between environmental literacy, interest in environmental issues and environmental activity engagement. As preliminary step, the study assessed the reliability and validity of each variable. The reliability of variables was assessed by examining their internal consistency values through computing the construct reliability (< 0.90), average variance extracted (AVE) (< 0.50) and Cronbach's Alpha values (< 0.70) [28] (Table 4). The discriminant validity test was performed to assess the validity of the variables (Table 5).

The results in Table 4 indicated that the construct reliability, AVE and alpha values were above the cut-off values, suggesting adequate reliability of the measurement items. Further, Table 5 shows that the square root of the AVE value of each variable was greater than the cross-correlations of the variables, verifying the discriminant validity of each variable of the study. Hence, the data were reliable and valid for further analysis.

The proposed framework of the study was tested by using the multiple regression analysis. Table 6 shows the results of regression analysis on the relationship between environmental literacy, interest in environmental activity and environmental activity engagement.

According to the results in Table 6, the R-Square value was 0.487 ($F = 87.207, p < 0.05$), which means that 48.7% of the variation in environmental engagement can be explained by environmental literacy and interest in environmental activity. The variation inflation factor (VIF) values of the independent variables were above 1 and below the threshold value of 5. In addition, the tolerance values of all the independent variables were higher than 0.20. The results further indicated that there is no multicollinearity issue in the model.

Table 4. Reliability analysis

Variable	AVE	Composite reliability	Cronbach's alpha
Environmental Literacy	0.63	0.82	.85
Interest in Environmental Activities	0.67	0.86	.74
Engage in Environmental Activities	0.62	0.88	.81

Table 5. Discriminant validity

Variable		EL	EI	EE
Environmental Literacy (EL)	Pearson correlation	.39*		
Interest in Environmental Activities (EI)	Pearson correlation	.22	.45*	
Engage in Environmental Activities (EE)	Pearson correlation	.21	.26	.38*

* square root of the AVE

Table 6. Regression analysis

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.	Collinearity statistics	
		B	Std. error	Beta			Tolerance	VIF
1	(Constant)	1.292	.154		8.394	.000		
	EL	.540	.049	.565	12.643	.000	.918	1.090
	EI	.533	.043	.557	12.296	.000	.893	1.120

a. Dependent Variable: EE

The p-values of EL and EI were less than 0.05, hence, environmental literacy and interest in environmental activity were significant influencers to environmental activity engagement. H1 (Environmental literacy influences the actual engagement in environmental activities of B.Com undergraduates in Sri Lanka) and H2 (Interest in environmental activities influences the actual engagement in environmental activities of B.Com undergraduates in Sri Lanka) are accepted.

5. CONCLUSION

The main objective of this study was to examine the extent of environmental literacy, interest in environmental issues and engagement of environmental activities of B.Com undergraduates in Sri Lanka. According to the low mean values in overall level of environmental literacy, it acknowledged the findings of [19,11,20,17], indicating that environmental literacy level of undergraduates was low. The respondents in this study also more familiar with water wastage, CSR, global climate and eco-friendly production process. These indicators are frequently discussed subject areas in the management degree programmes in Sri Lanka. Hence, these results facilitate to recommend that B.Com degree programme should be integrated with other environmental areas such as environmental accounting and audit, emission trading, eco label and carbon footprint.

Since the respondents were most interested in methods of enhancing environmental sustainability and community services on environmental sustainability, undergraduates need to be encouraged to participate public seminars relating to environmental issues and watch environmental related documentaries. These can be achieved by designing the assignment-based activities on environmental related subject areas in subject specifications.

The study established the link among undergraduates' environmental activity, environmental literacy, interest in environmental issues. It is found that environmental literacy level and interest in environmental activities were significant predictors on actual engagement in environmental activities. This result confirmed the argument of Arnon [10] that it is necessary to have both environmental knowledge and attitudes if they are to influence environmental behaviour. Further, when citizens are knowledgeable about the environment, it will lead

them to good environmental behaviour and live sustainable life styles [29,1]. Hence, the study recommends that academic curriculum of B.Com degree programme needs to be integrated with more environmental areas in order to protect and retain environmental sustainability.

From the research perspective, it is hoped that this study provides the impetus for more research to be conducted in the future. This study obtained information from only B.Com undergraduates in state universities in Sri Lanka. The valid and reliable variables used in this study can be used by other degree programmes. Further study is also required to conduct a comparative study in public and private universities in Sri Lanka. In order to enable undergraduates' attention towards environmental issues and actions, further study is required to examine the environmental literacy level among non-business undergraduates.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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