



Original Article

## Environmental Literacy and Practice of Environmental Sustainability among Secondary School Students in Busia District, Eastern Uganda

Wandera Eustance<sup>1</sup>, Dr. Andama Edward, PhD<sup>1\*</sup>, Dr. Atibuni Dennis Zami, PhD<sup>1,2</sup> & Ujeyo Margaret Stella Suubi<sup>1</sup>

<sup>1</sup> Busitema University-Nagongera Campus, P. O. Box 236, Tororo, Uganda.

<sup>2</sup> Ali Mazrui Centre for Higher Education Studies, University of Johannesburg, Auckland Park Kingsway Campus, P. O. Box 524, Auckland Park 2006 Johannesburg, South Africa

\* Author for Correspondence ORCID ID: <https://orcid.org/0000-0002-5437-4134>; Email: [andamaedward@gmail.com](mailto:andamaedward@gmail.com)

Article DOI: <https://doi.org/10.37284/eajes.5.2.644>

### Date Published: ABSTRACT

28 April 2022

### Keywords:

*Environmental Education,  
Environmental Literacy,  
Environmental Practice,  
Sustainable Development.*

Environmental education is vital to promote knowledge, skills, attitudes, and practices to solve environmental problems, in the long run building a sustainable environment for current and future generations. This study aimed at determining the influence of Environmental Literacy (EL) on the practice of Environmental Sustainability (ES) among secondary school students in Busia District in Eastern Uganda. Using parallel convergent mixed methods and cross-sectional survey designs, 466 participants including 409 randomly selected students in 12 secondary schools filled the Environmental Literacy Survey (ELS) tool and questionnaire on the practice of ES. Forty-eight students from 6 randomly selected schools in 6 groups participated in focus group discussion (FGD), and 9 teachers of Geography, Agriculture, and Biology from 3 schools participated in an FGD. The results indicate that the students had a functional level of EL ( $M = 115.72, SD = 18.27$ ), and a moderate level of practice of ES ( $M = 38.83, SD = 8.39$ ). There was a significant relationship between EL and ES ( $r = .446, p < .01$ ) which suggested that the secondary school curriculum yielded a functional EL. The level of EL was higher than the level of practice of ES. We recommend that the teaching profession should address the gap in attitude and practice by balancing the learning experiences in the school curriculum on the environmental knowledge, attitudes towards the environment as well as behaviour and practice of environmental sustainability.

#### APA CITATION

Eustance, W., Edward, A., Zami, A. D. & Suubi, U. M. S. (2022). Environmental Literacy and Practice of Environmental Sustainability among Secondary School Students in Busia District, Eastern Uganda. *East African Journal of Education Studies*, 5(2), 1-12. <https://doi.org/10.37284/eajes.5.2.644>.

#### CHICAGO CITATION

Eustance, Wandera, Andama Edward, Atibuni Dennis Zami & Ujeyo Margaret Stella Suubi. 2022. "Environmental Literacy and Practice of Environmental Sustainability among Secondary School Students in Busia District, Eastern Uganda". *East African Journal of Education Studies* 5 (2), 1-12. <https://doi.org/10.37284/eajes.5.2.644>.

#### HARVARD CITATION

Eustance, W., Edward, A., Zami, A. D. & Suubi, U. M. S. (2022) "Environmental Literacy and Practice of Environmental Sustainability among Secondary School Students in Busia District, Eastern Uganda", *East African Journal of Education Studies*, 5(2), pp. 1-12. doi: 10.37284/eajes.5.2.644.

#### IEEE CITATION

W. Eustance, A. Edward, A. D. Zami & U. M. S. Suubi. "Environmental Literacy and Practice of Environmental Sustainability among Secondary School Students in Busia District, Eastern Uganda", *EAJES*, vol. 5, no. 2, pp. 1-12, Apr. 2022.

#### MLA CITATION

Eustance, Wandera, Andama Edward, Atibuni Dennis Zami & Ujeyo Margaret Stella Suubi. "Environmental Literacy and Practice of Environmental Sustainability among Secondary School Students in Busia District, Eastern Uganda". *East African Journal of Education Studies*, Vol. 5, no. 2, Apr. 2022, pp. 1-12, doi:10.37284/eajes.5.2.644.

## INTRODUCTION

Education plays an important role in addressing the complexity of environmental challenges (Jickling & Wals, 2008). Education is one of the major techniques available to change the behaviour or compliance with new legislations (Sunderland, 2000). Environmental education is an effort to manage the environment through a formal approach by providing insight knowledge to students (Carleton-Hug & Hug, 2010). Environmental education is a commitment of the international governments and community and is implemented through the school curriculum (Wardani *et al.*, 2018). The main goal of environmental education is to improve knowledge of environmental literacy, for better attitude toward the environment, and improve pro-environment behavior (Spínola, 2015). It also promotes concern among the citizens on the challenges associated with environmental degradation and pollution.

The global concept of sustainable development which emerged in the 1980s in response to the growing realization that the economic and social activities have potential to compromise environmental quality as well as lower the productivity potential of natural resources (NEMA 2012). Around the world government environment issues were previously neglected in the national curricula and yet most government policies suggest

that all sectors of society Depend on the environment (Rosenberg (2009). It is the justification why the 2002 Johannesburg World Summit on Sustainable Development (WSSD) called for the UN to convene a decade of Education for Sustainable Development, emphasizing the key role education has to play in environmental protection and social development (Rosenberg, 2009).

As a consequence, WSSD declared that the three pillars that hold sustainable development are social, economic and environmental spheres. Sustainable development was a key issue at the Earth summit held in Rio de Janeiro in 1992 where 179 countries agreed on a blue print for ways to make the future development of the world economically, socially and environmentally sound and sustainable. With the two-world events emphasis on environmental issues have in the past few decades become a hot subject of discussion in international conferences, summits as well as global deliberations (Fah & Sirisena, 2014). Resolutions of these conferences, conventions, and declarations greatly informed the environmental goals in the Millennium Development Goal (MDGs) and subsequently the Sustainable Development Goals (SDGs) in which MDG 7 ensuring environmental sustainability (Jordan's, 2013) and SDG goal 15 emphasis is on protecting, restoring and promoting sustainable use of terrestrial ecosystems,

sustainably managing forests, combating desertification, halting and reversing land degradation and biodiversity loss in general.

All the concerns from MDG-7 and SDG-15 indicate the gravity of the effort that the international community should put in to combat the deteriorating state of the environment. In the United Nations Conference in Stockholm (Sohn, 1973), a commitment to raise public awareness about the degenerating environment and what can be done to reverse it was agreed upon; and 20 years later, the Stockholm commitment was a subject of discussion at the Earth Summit in Rio de Janeiro (Tosun & Campus, 2016). This global attention given to the subject of the environment is because the environmental adversaries on the globe do not segregate on the rich or poor countries, already developed or yet to develop countries; the flooding, pollution, desertification, global warming, and many others affect all alike (Ali *et al.*, 2017). At continental level, African Environment Ministers at the fourth session on the African Ministerial Conference of the Environment (AMCEN) recognized education as an effective means for confronting environmental challenges and identifying future opportunities.

It is only through good environmental education that we expose students not only to environmental concerns, attitude change and sustainability practices but also to sound learning and practices. The UN Decade of Education for sustainable development (2005-2014) seeks to integrate the value inherent in sustainable development into all aspects of learning to encourage changes in behaviour that allow for more sustainable and just society for all. This has created demand to include education for sustainable development (ESD) which is part of environmental education in all levels of learning and prompted reform of the curriculum and teaching programmes at different all levels, leading to sustainable school and university movements. This is because education acts as springboard through which learners acquire and practice the global values, skills and attitudes for sustainable development (NEMA, 2012). The justification of promoting environmental education is that students and thus the communities that have environmental literacy (Erdoğan *et al.*, 2009), will be able to

behave in an honourable and environmentally responsible manner (Ramdas & Mohamed, 2014).

The efforts to fulfil the above environmental world agenda have received attention from the governments in the world including Uganda by including environmental education (EE) in the formal education systems. In support of the foregoing stance, environmental education concepts and content was incorporated in the secondary school curriculum in Uganda focusing on subjects such as Geography, Biology, and Agriculture that are offered at the Ordinary level (Vandenbosch, 2006). The government of Uganda realized that sound education through training on EE and ESD in primary, secondary, tertiary colleges, universities and community education was the only means to overcome the problems by making people become aware of the environmental development challenges that were happening (Nature Uganda, 2012). This coupled with activities in environmental clubs and societies are designed to provide EE and therefore EL, as suggested by (Spínola, 2015). In addition to these efforts, some universities like Busitema University in Uganda have included a course unit on education for sustainable development (ESD) to benefit students across all of its programmes. This was aimed at mainstreaming sustainability agenda that empowers communities to take charge of their development action through sustainable natural resources utilization, positive changes in attitudes and behaviours.

Despite enormous efforts, ranging from the Uganda government ratifying the world environmental statutes, conventions, to the inclusion of environmental education in the national curriculum right from primary schools to university level, to provide environmental literacy, gaps still exist in the practice of environmental sustainability. This can still be observed in Uganda for instance the rapid loss of forest cover which plummeted from 24% of its area in 1990 to 9% in 2015 (MWE, 2016), observations of poor disposal of waste in the urban centres, poor farming methods among others (MWE, 2016). The question is whether the environmental literacy being provided is not being translated into the practice of environmental sustainability, a reason why this study was undertaken. The overall objective of this study was to determine the influence of Environmental

Literacy (EL) on the practice of Environmental Sustainability (ES) among secondary school students in Busia District. Specific objectives were to determine (i) the levels of Environmental Literacy among secondary school students, (ii) levels of the practice of ES among secondary school students, and (iii) relationship between the Environmental Literacy and Practice of environmental Sustainability among secondary school students. The study provides specific practical guidelines for practitioners and policy makers related to school-community linkages that should increase the likelihood of successful learning outcomes for environmental education in learning institutions and communities.

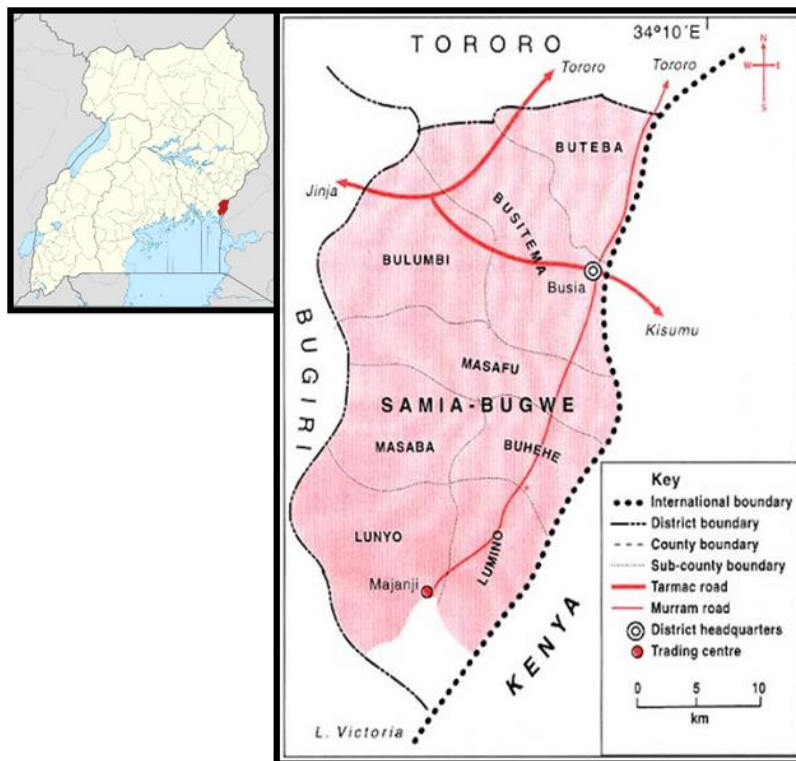
## MATERIALS AND METHOD

### Target Population and Research Design

The study was undertaken in Busia District located in south-eastern Uganda (*Figure 1*). We employed parallel convergent mixed methods for both quantitative and qualitative data. A cross-sectional

survey design that focused on all students in the secondary schools to obtain a simple relationship between the two variables: Environment Literacy and Practice of Environmental Sustainability among secondary school students in Busia District. The cross-sectional design was used because the study focused on the relationship between the two study variables at a point in time. A qualitative method was used, focusing on teachers of Geography, Biology, and Agriculture and some students in Focus Group Discussions (FGD) to collect in-depth information about teachers' and students' Environmental knowledge, attitudes, behaviours, and practices of environmental sustainability. The Environmental Literacy Survey (ELS) instrument used was adapted from the Larson *et al.* (2011), modified Wisconsin Environmental Survey (WES) and the items and statements were modified. The ELS instrument was modified to fit in the Ugandan context basing on the Environmental and Social Management Framework for Secondary Schools (Saphina, 2017). The ELS instrument focused on waste disposal, grass and tree planting, and cutting and sustainable farming practices.

**Figure 1: Location of Busia District Uganda**



### Data Collection and Analysis

Section A of the ELS comprised of 15 multiple-choice questions concerning Environmental Knowledge; the correct responses were assigned a score of four (4) and the incorrect responses were assigned a score of zero (0). In the 15 items, the lowest possible score for Environmental Knowledge was zero (0) and the highest possible score was sixty (60). The modified ELS instrument had 15 items on Attitudes towards the environment in section B; these were scored using a 5-point Likert scale. The scale ranged from Strong Disagree to Strongly Agree and the responses were awarded zero (0) for least desirable environmental attitudes and four (4) for the most preferred environmental attitudes. Therefore, the lowest possible score for this subscale was zero (0) and the highest possible score was sixty (60). Section C of the ELS measured the behaviour in the environment. It had a further 15 items that were scored on a 5-point Likert scale. The scale ranged from Never to Almost Always subscales for each of the items. A score of zero (0) was given to the least desirable environmental behaviour while a score of four (4) was awarded to a highly desirable pro-environmental behaviour. The least possible score for all the 15 items in this section was zero (0) and the highest possible score was sixty (60). The total score for all the three sections: A, B, and C of the ELS had a possible range of 0 and 180; Section D had the questionnaire on the practice of environmental sustainability had 15 items capturing aspects of waste disposal, tree/grass planting and cutting as well as sustainable

farming practices, each item was scored on a 5-point Likert scale ranging from 4 (Strongly Agree) to 0 (strongly Disagree), the scores were then summed to obtain the overall score on a range of 0 to 60. To reduce any bias during data collection, efforts were made both in the design of the survey and the interview process.

The deference effect bias is when respondents respond in a manner that reflects well on themselves (Newing *et al.*, 2011). To reduce this bias, it was specified to the respondents at the start of each interview that there was no right answer and that we were purely interested in an understanding of the local knowledge, practice, and attitude from the respondents. For individual interviews, the respondents were interviewed individually to prevent audience effect bias. The interviews were recorded (after seeking permission) to ensure that any details were not forgotten. The option to say that they did not know was included and questions were phrased neutrally. Typically, the interviews lasted on average 10-12 minutes. There was effective communication during the interview since all respondents spoke English.

## RESULTS AND DISCUSSION

### Sample Demographics

The sample demographics were categorized according to participants' age, gender, class, and location of the school of the participants as shown in *table 1*.

**Table 1: Study Sample Demographics (N = 409)**

		Frequency	Percent
Age of Participants	12-13	29	7.1
	14-15	114	27.9
	16-17	163	39.9
	18-19	79	19.3
	20-21	20	4.9
	22 and above	4	1.0
Gender of Participants	Male	222	54.3
	Female	187	45.7
Class of Participants	S1	115	28.1
	S2	94	23.0
	S3	93	22.7
	S4	77	18.8
	S5	16	3.9
	S6	14	3.4
Location of the School	Rural	217	53.1
	Urban	192	46.9

The majority of the students in the secondary schools were teenagers although some of the students were above the average age for one to be in a secondary school (more than 20 years). There were more male students than female students who participated in the study. This implies that more male students were going to school to attain formal education and therefore environmental literacy as compared to female students. The distribution of the student participants in terms of the location of their schools showed that there was nearly equal representation of both the students from the rural schools as well as the urban schools.

The largest number of participants in the study were in O-level (S1-S4) and a few of them were in

A-level (S5 and S6), this was because the student population was higher in O level than in A level.

#### **Levels of Environmental Literacy among Secondary School Students in Busia District**

Each of the three individual dimensions of environmental literacy was categorized as either low, moderate, or high while the overall level of environmental literacy was to be categorized as either Environmental Illiteracy, Nominal Environmental Literacy, Functional Environmental Literacy, or Highly Evolved Environmental Literacy (*Table 2*).

**Table 2: Levels of Environmental Literacy in the various dimensions among Secondary School Students in Busia District.**

Dimensions	Min	Max	Mean	Std. Dev	Levels
Environmental Knowledge	12	60	43.68	8.95	High
Behaviour in the Environment	1	60	34.67	9.13	Moderate
Attitudes towards the environment	19	55	37.37	6.73	Moderate
Environmental Literacy	62	168	115.72	18.27	Functional

The result indicates that secondary school students in Busia District exhibited High Environmental Knowledge levels ( $M = 43.68$ ,  $SD = 8.95$ ) with a

minimum score of 12.00 and a maximum score of 60.00. In terms of environmental knowledge, most of the students correctly answered the questions

structured on environmental concepts from the local context in Busia District. Moderate behaviour in the environment ( $M = 34.67, SD = 9.13$ ) with a minimum score of 1.00 and a maximum score of 60.00 was observed; a good number of the students ignored polythene bags on the ground when they come across them, they do not advise others on the use of farming practices that reduce soil erosion as well as soil fertility. Moderate Attitude towards the environment ( $M = 37.37, SD = 6.73$ ), a minimum score of 19.00, and a maximum score of 55.00 were observed. A good number of the students in Busia District indicated, from their responses, to be concerned with the amount of poorly disposed waste in their community and also showed that they were interested in the issues of the environment by

paying attention to environmental components like planting trees, grass, crops, and many others. Overall, secondary school students in Busia District showed a functional level of environmental literacy ( $M = 115.72, SD = 18.27$ ) with a minimum score of 62.00 and a maximum score of 168.00; this means the secondary school students in Busia District correctly define environmental concepts, understand how environmental systems are organized and function and how the different subunits in the environment relate to human-welfare. They also possess knowledge and skills to take action to solve environmental problems arising in their immediate environment and have a broader knowledge and understanding of how human and natural systems interact.

**Table 3: Levels of Environmental Literacy in the different Demographics among Secondary School Students in Busia District**

		Levels of Environmental Literacy				
		Environmental Illiteracy	Nominal EL	Functional EL	Highly Evolved EL	Total
Age	12-13	0(0.0)	1(3.4)	22(75.9)	6(20.7)	<b>29 (100.0)</b>
	14-15	0(0.0)	15(13.2)	83(72.8)	16(14.0)	<b>114 (100.0)</b>
	16-17	0(0.0)	13(8.0)	128(78.5)	22(13.5)	<b>163 (100.0)</b>
	18-19	0(0.0)	2(2.5)	68(86.1)	9(11.4)	<b>79 (100.0)</b>
	20-21	0(0.0)	3(15.0)	12(60.0)	5(25.0)	<b>20 (100.0)</b>
	22 +	0(0.0)	0(0.0)	4(100.0)	0(0.0)	<b>4 (100.0)</b>
	<b>Total</b>		<b>0(0.0)</b>	<b>34(8.3)</b>	<b>317(77.5)</b>	<b>58(14.2)</b>
Gender	Male	0(0.0)	11(5.0)	171(77.0)	40(18.0)	<b>222 (100.0)</b>
	Female	0(0.0)	23(12.3)	146(78.1)	18(9.6)	<b>187 (100.0)</b>
	<b>Total</b>	<b>0(0.0)</b>	<b>34(8.3)</b>	<b>317(77.5)</b>	<b>58(14.2)</b>	<b>409 (100.0)</b>
Class	S1	0(0.0)	14(12.2)	85(73.9)	16(13.9)	<b>115 (100.0)</b>
	S2	0(0.0)	12(12.8)	68(72.3)	14(14.9)	<b>94 (100.0)</b>
	S3	0(0.0)	2(2.2)	81(87.1)	10(10.8)	<b>93 (100.0)</b>
	S4	0(0.0)	6(7.8)	63(81.8)	8(10.4)	<b>77 (100.0)</b>
	S5	0(0.0)	0(0.0)	10(62.5)	6(37.5)	<b>16 (100.0)</b>
	S6	0(0.0)	0(0.0)	10(71.4)	4(28.6)	<b>14 (100.0)</b>
	<b>Total</b>		<b>0(0.0)</b>	<b>34(8.3)</b>	<b>317(77.5)</b>	<b>58(14.2)</b>
School Location	Rural	0(0.0)	16(7.4)	168(77.4)	33(15.2)	<b>217 (100.0)</b>
	Urban	0(0.0)	18(9.4)	149(77.6)	25(13.0)	<b>192 (100.0)</b>
	<b>Total</b>	<b>0(0.0)</b>	<b>34(8.3)</b>	<b>317(77.5)</b>	<b>58(14.2)</b>	<b>409 (100.0)</b>

Key: EL = Environmental Literacy

Table 3 shows that no student was at the level of environmental illiteracy, and most of the students were at the level of functional environmental literacy. The results indicate that among all the age brackets of the participants, no age bracket indicated

to be at the level of environmental illiteracy, and the majority of the learners, across all age brackets, exhibited a functional level of environmental literacy. There was no difference in the levels of EL literacy owing to the gender differences between

males and females although, at the level of highly evolved EL, there was a higher percentage within the males than within the females. This indicated that the number of males who were highly grounded in EL was higher than the number of females. There was no significant difference in the levels of environmental literacy, in the components of the environment under study, among the secondary school students in terms of their classes. This probably because by the end of primary seven before progressing to secondary school, and in S1 through which all the students have passed, these concepts will have been taught. There was no

significant difference in the levels of EL posted by the students from rural and urban secondary schools in Busia District. This could be because a number of the students who study in the urban day schools in the urban areas commute from the rural places of abode or homes.

**Levels of the Practice of ES among Secondary School Students in Busia District**

There were three possible levels of practice of ES; these were low, moderate, and high levels of practice of ES (*Table 4*).

**Table 4: The overall level of practice of Environmental Sustainability among secondary school students in Busia District**

	N	Minimum	Maximum	M	SD	Level
Practice of ES	409	14.00	58.00	38.83	8.39	Moderate

*Note: N = Number, M = Mean, SD = Standard Deviation*

The results in *Table 5* indicate that the overall level of practice of ES among the secondary school students in Busia District was moderate ( $M = 38.83$ ,  $SD = 8.39$ ), a minimum score of 14.00 and a maximum score of 58.00. These results indicate that either in their homes or in their schools or both, they have contributed to the planting or the survival of the planted trees, always ensure proper disposal of

both decomposable and recyclable waste, and practice sustainable farming practices. As indicated in *Table 5*, the majority of the students in Busia District showed a moderate level of practice of ES, followed by those that exhibited a high level of practice of ES and very few indicated a low level of practice of ES.

**Table 5: Levels of the practice of Environmental Sustainability among the different demographics**

		Levels of the practice of ES among students			Total
		Low	Moderate	High	
Age of Participants	12-13	0(0.0)	17(58.6)	12(41.4)	29(100.0)
	14-15	3(2.6)	65(57.0)	46(40.4)	114(100.0)
	16-17	1(0.6)	98(60.1)	64(39.3)	163(100.0)
	18-19	1(1.3)	44(55.7)	34(43.0)	79(100.0)
	20-21	1(5.0)	8(40.0)	11(55.0)	20(100.0)
	22 +	0(0.0)	3(75.0)	1(25.0)	4(100.0)
<b>Total</b>		<b>6(1.5)</b>	<b>235(57.5)</b>	<b>168(41.1)</b>	<b>409(100.0)</b>
Gender of Participants	Male	3(1.4)	121(54.5)	98(44.1)	222(100.0)
	Female	3(1.6)	114(61.0)	70(37.4)	187(100.0)
<b>Total</b>		<b>6(1.5)</b>	<b>235(57.5)</b>	<b>168(41.1)</b>	<b>409(100.0)</b>
Class of the Participants	S1	2(1.7)	66(57.4)	47(40.9)	115(100.0)
	S2	0(0.0)	57(60.6)	37(39.4)	94(100.0)
	S3	1(1.1)	56(60.2)	36(38.7)	93(100.0)
	S4	2(2.6)	43(55.8)	32(41.6)	77(100.0)
	S5	1(6.2)	9(56.2)	6(37.5)	16(100.0)
	S6	0(0.0)	4(28.6)	10(71.4)	14(100.0)



<b>Total</b>		<b>6(1.5)</b>	<b>235(57.5)</b>	<b>168(41.1)</b>	<b>409(100.0)</b>
Location of the School	Rural	3(1.4)	115(53.0)	99(45.6)	217(100.0)
	Urban	3(1.6)	120(62.5)	69(35.9)	192(100.0)
<b>Total</b>		<b>6(1.5)</b>	<b>235(57.5)</b>	<b>168(41.1)</b>	<b>409(100.0)</b>

The majority of the students across all the age brackets in the secondary schools in Busia district exhibited moderate levels of practice of ES except those in the age bracket 20-21 where the majority, 55 percent, showed a high level of practice of ES, this was because probably students getting in their 20s develop more positive attitudes towards the environment and have pro-environmental behaviour which makes their practice of ES higher than for the lower classes. Therefore, a higher percentage, 61 percent, of female students compared to male students, 54.5 percent, showed a moderate level of practice of ES and in a similar vein, a higher percentage of the male participants, 44.1 percent, than the percentage of the female participants, 37.4 percent, exhibited a high level of practice of ES. There was no marked difference in the low level of practice of ES owing to the sex difference between the students. Most students across all classes posted a moderate level of practice of ES while some students posted high levels of practice of ES and very few posted low levels of practice of ES. This

means that many students put the effort into preparing places for proper waste disposal, plant and conserve trees and grass covers, and carry out sustainable farming practices. The high levels of practice of ES among the S6 students stood out. This could be because they were older than the other lower-level class students and therefore act in an environment with more responsibility than their counterparts in the lower classes and who were relatively younger.

**Relationship between the Environmental Literacy and Practice of environmental Sustainability among secondary school students in Busia District**

There was a moderate positive relationship between the level of Environmental Literacy and the practice of environmental sustainability among the secondary school students in Busia District ( $r = .446, p < .01$ ).

**Table 6: Relationship between Environmental Literacy and Practice of Environmental Sustainability among secondary school students in Busia District**

	1	2	3	4	5
1. Knowledge	1				
2. Attitude	.301**	1			
3. Behaviour	.291**	.334**	1		
4. EL	.747**	.683**	.765**	1	
5. Practice of ES	.219**	.345**	.423**	.446**	1

Note: \*\* = Correlation was significant at the 0.01 level (2-tailed), EL = Environmental Literacy, ES = Environmental Sustainability

There was a weak positive relationship between the students’ environmental knowledge and attitude towards the environment. There was also a weak positive relationship between environmental knowledge and behaviour in the environment and then there was a weak positive relationship between Attitude towards the environment and behaviour in the environment. There was a strong positive relationship between Environmental knowledge and Environmental Literacy. There was also a strong positive relationship between Attitude towards the environment and environmental literacy and there

was also a strong positive relationship between behaviour in the environment and Environmental Literacy. There was a moderately positive relationship between Environmental Literacy and the Practice of Environmental Sustainability. These findings have greater implications on the pedagogical approach used, course materials prepared to deliver the knowledge which are relevant mechanisms for information sharing, provoking critical thinking and deliberations to assist learners in constructing new knowledge and developing skills and attitude which enhances their

reflexivity and capacity to be agents of change so that as individuals and communities and institution to work towards more sustainable future.

### **Findings based on the FGD with O-Level Students.**

The students also posted that in school, other than in the mainstream subjects, they learn environmental aspects from clubs such as Wildlife Clubs, Environment clubs, Educate Clubs, and others in which the learners organize themselves within their school. But outside school, they attend village meetings that were at times organized by Non-Governmental Organizations (NGOs) like World Vision, Christian Children's Fund, and others, also through Local Councils that aim at sensitizing the communities on why they need to improve the quality of their environments, sanitation, and good farming practices. These students also stated that the waste from their kitchens, canteens, and classrooms was collected in the dust bins which were then emptied into the rubbish pits, and then when they accumulate, they were burnt or used to make manure. Evidence of these dustbins where rubbish and waste were disposed of was there in most of the schools where the study was conducted, however, in many schools, the dust bins, and rubbish pits would get full and get left unattended for a long time. Most of the students hold that they engaged in maintaining a sustainable environment by participating in compound cleaning at home and at school to maintain good hygiene and healthy surroundings which they learn in Biology. They also help their parents in practicing Agroforestry because they learn this in Agriculture, where trees are planted within the farms for fruits, firewood, and poles. At the school level, they engaged in planting green zones (grass and trees) as well as hedges aimed at conserving the environment.

### **Findings based on the FGD with A-Level Students.**

The A-level students hold that for the years they have been in school, they have learned that the environment was the source of human livelihood and they should not only conserve it but make it better for the future generations to get it better by planting more trees, minimizing the use of polythene bags proper disposal of waste among

other environmentally sustainable practices and behaviours. Just as the O-level students, the A-level students also posted that in school, other than in the mainstream subjects, they learn environmental aspects from clubs such as Wildlife Clubs, Environment clubs, Educate Clubs, and so on. But outside school, they attend village meetings that are at times organized by Non-Governmental Organizations (NGOs) and Local Councils that aim at sensitizing the communities on why they need to improve the quality of their environments, sanitation, and good farming practices. These students also stated that the waste from their kitchens, canteens/shops at school and home was collected in the dust bins which were then emptied in the rubbish pits, and then when they accumulate, they were burnt. The A-level students claim that having learned in school about the need for and participating in activities such as planting trees, proper waste management, good farming practices, planting hedges and grass in their compounds, their attitudes, and behaviours towards the environment have been changed in the positive sense.

### **Findings based on the FGD with Teachers.**

The FGD was with teachers of Agriculture, Biology, and Geography; all teachers in these disciplines hold that there were contents and topics that directly relate to the environment such as Lumbering in Geography, Crop husbandry, and Agroforestry in Agriculture and plants in Biology. The teachers could however not precisely state the percentage of these contents in the subjects they teach. They observed that their students put into practice at school and home what they learn at school by participating in compound cleaning, farming in school, and home gardens as well tree planting both within the school and at home. The teachers generally posit that they develop positive attitudes and acceptable behavior in the learners towards the environment by encouraging to join environment clubs, working in groups, and educating them on the advantages of maintaining a sound environment such as improving the quality of air to breathe and quality of health. They also engage the learners in environment-related activities like compound cleaning, tree planting, proper waste disposal, the practice of modern farming practices, and many others. This was

because some of these teachers were patrons of environment and wildlife clubs.

The teachers also consent that the school administration supports their activities especially in availing the land and buying the plant and tree seedlings that they use for planting. There was evidence of tree plantations in schools for which the teachers held that they had been planted by students in the schools. This study has indeed shown that students in the study schools had moderate performance in aspects of environmental knowledge, attitude, and behaviours. It was interesting to note that the thematic areas in which, the students at various academic levels were able to articulate environmental knowledge, attitude, and behaviour on waste management, sustainable farming were good. This suggests that different approaches and contributions in and out of school context were influencing student's environmental literacy and behaviours, which needs to be clarified by further studies.

## CONCLUSION AND RECOMMENDATIONS

This study revealed high level of awareness about environmental practices that promote sustainable development in the secondary school students in Busia District. The candidates exhibited a functional level of environmental literacy; this coupled with the high levels of environmental knowledge meant the students had a clear understanding of how environmental systems function and relate to human welfare. This showed that they had the prerequisite literacy levels to take the right actions in case of environmental-related problems. That awareness was necessary condition for ES and therefore innovative initiatives should be promoted to enhance support towards learning of ESD in the institutions of learning. We recommend that the teaching profession should address the gap in attitude and practice by balancing the learning experiences in the school curriculum on the environmental knowledge, attitudes towards the environment as well as behaviour in the environment. We also recommend studies to find out if physical resources are adequate and whether the pedagogical approaches are appropriate for experiential learning, exploration, observation, critical thinking and problem-solving activities which are related to ESD teaching.

## ACKNOWLEDGMENTS

This study was funded in part by the Swedish International Development Cooperation Agency (Sida) and Makerere University under Sida contribution contract No: 51180060. This interdisciplinary research paper is part of a dissertation that was submitted as partial fulfilment to meet requirements for the degree of Master of Educational Leadership and Management of Busitema University.

## AUTHOR'S CONTRIBUTION

Wandera conceptualized the central research idea, carried out the fieldwork and drafted the article. Andama designed the research, supervised research progress, guided in paper writing, review, revisions. Ujeyo Margaret Stella Suubi provided the theoretical framework. Atibuni reviewed the research design and theoretical framework, guided in paper writing. All authors approved the submission of the article for publication.

## CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest.

## REFERENCES

- Ali, A. R., Endut, A., & Embong, R. (2017). Investigating the environmental awareness level of secondary school students: Effects of race, school type, and location. *Journal of Science and Technology*, 9(4).
- Carleton-Hug, A., & Hug, J. W. (2010). Challenges and opportunities for evaluating environmental education programs. *Evaluation and program planning*, 33(2), 159-164.
- Erdoğan, M., Kostova, Z., & Marcinkowski, T. (2009). Components of environmental literacy in the elementary science education curriculum in Bulgaria and Turkey. *Eurasia Journal of Mathematics, Science and Technology Education*, 5(1), 15-26.
- Fah, L. Y., & Sirisena, A. (2014). Relationships between the knowledge, attitudes, and behavior dimensions of environmental literacy: A

- structural equation modeling approach using smart pls. *Jurnal Pemikir Pendidikan*, 5.
- Jickling, B., & Wals, A. E. (2008). Globalization and environmental education: Looking beyond sustainable development. *Journal of curriculum studies*, 40(1), 1-21.
- Jordan's, M. (2013). Jordan.
- Larson, L. R., Green, G. T., & Castleberry, S. B. (2011). Construction and validation of an instrument to measure environmental orientations in a diverse group of children. *Environment and Behavior*, 43(1), 72-89.
- MWE. (2016). *State of Uganda's Forestry 2016*. Ministry of Water and Environment Kampala. Kampala: GoU.
- NEMA (2012). *Baseline survey of awareness of education for sustainable development in learning institutions in Kenya*. Report No.5. NEMA Kenya. Nairobi Kenya.
- Nature Uganda (2012). ACT and LEARN- A guide to supplementary teaching and learning through Education for Sustainable Development (ESD). First Edition.
- Newing, H., Eagle, C., Puri, R., & Watson, C. (2011). Researching conservation: a social science perspective. Abingdon. *Routledge*, doi, 10, 9780203846452.
- Ramdas, M., & Mohamed, B. (2014). Impacts of tourism on environmental attributes, environmental literacy and willingness to pay: A conceptual and theoretical review. *Procedia-Social and behavioral sciences*, 144, 378-391.
- Rosenberg, E. 2009. Teacher Education Workbook for Environment and Sustainability Education. Rhodes University Environment Education and Sustainability Unit, Grahamstown, Distributed through Share-Net Howwick.
- Saphina, N. (2017). Privatization in education and discrimination: Its impact on the right to education in Uganda. *ESR Review: Economic and Social Rights in South Africa*, 18(1), 10-12.
- Sohn, L. B. (1973). Stockholm Declaration on the human environment, the. *Harv. Int'l. LJ*, 14, 423.
- Spínola, H. (2015). Environmental literacy comparison between students taught in Eco-schools and ordinary schools in the Madeira Island region of Portugal. *Science Education International*, 26, 392-413.
- Sunderland W.J. (2000). The conservation handbook. research, management and policy. Blackwell Science.
- Tosun, E. K., & Campus, A. O. S. (2016). Environmental literacy levels of the classroom teachers in Turkey: A research towards the classroom teachers serving in Bursa. *The Online Journal of New Horizons in Education-July*, 6(3).
- Vandenbosch, T. (2006). Post-primary agricultural education and training in sub-Saharan Africa: Adapting supply to changing demand. *Unpublished manuscript, World Agroforestry Centre, Nairobi, Kenya*.
- Wardani, R., Karyanto, P., & Ramli, M. (2018). *Analysis of high school students' environmental literacy*. Paper presented at the Journal of Physics: Conference Series.