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Comparison between the Understanding Levels of Boys and Girls on the Concepts of Environmental Degradation, Meteorology and Climate Change in Tanzanian Secondary Schools

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Abstract

The study aimed to determine whether there was any significant difference in understanding levels between secondary school boys and girls on the concepts of environmental degradation, meteorology and climate change. Both structured survey and focus group discussions were used to collect information from 480 students, sampled randomly from 12 secondary schools in Morogoro region. The findings indicated that boys were significantly more knowledgeable than girls on the specified environmental concepts. This implies that girls lagged behind their counterparts in understanding important environmental concepts as specified in the school curriculum. Based on the findings of this study, it is recommended that girls should be inspired and encouraged to develop interest in natural science subjects which would enable them to broaden their understanding about environmental issues.

Keywords: Boys, Girls, Environmental education, Climate change, Meteorology, Syllabus.

Contents

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1. Introduction

Scientific findings indicate that environmental degradation and the changing climate has a significant impact on our planet's biodiversity, water resources and human activities, especially agriculture. In Tanzania, food production through agriculture is an activity which is mostly done by women, especially in the rural areas (SOFA and Doss, 2011). Effects of climate change threaten food production and availability of water. For example, the regions of Tanzania which have one rainy season, such as Dodoma and Tabora, will have maize production decreased to as much as 84% (Mirza, 2003). Also, the availability of freshwater in Tanzania is expected to decrease by over half from 1990 levels by 2025 (WWAP, 2006). Since women are more involved in producing food and fetching water for households than men, the effects of climate change will essentially be felt severely by women.

The IPCC (2007) assessment on the science and implications of climate change report concluded that only immediate and sustained action will stop climate change from causing irreversible and potentially catastrophic damage to our environment. Immediate and sustained action against climate change requires both mitigation and strategies for societal adaptation (Preston and Jones, 2006). Since the ability of the society to mitigate or adapt climate change is contingent to awareness on environmental issues, Tanzania introduced environmental education in all levels of education in a multidisciplinary way (Kimaryo, 2011).

In the certificate of secondary education, environmental concepts in the curriculum include the concept of energy in physics and chemistry, and interaction of living organisms in biology and weather and human activities in geography (Biology syllabus, 2005; Chemistry syllabus, 2007 and Geography syllabus, 2005; Physics syllabus, 2007). However, considerable concepts of meteorology and climate change are only included in geography.

The aim of raising students' awareness on environmental management by integrating environmental issues with natural science subjects in Tanzanian secondary schools is a challenge because the number of secondary school students who opt for natural science subjects has been decreasing yearly. This is caused by several reasons including constantly decreasing students' performance in science subjects compared to non-science subjects. The decrease in number of students who opt for natural science subjects is even more pronounced for girls than boys as some girls in Tanzania have a notion that natural science subjects are too difficult for them to be able to study successfully (UNESCO, 2009). Meteorological concepts which describe climate change such as climate, weather and human activities are mostly addressed in the geography syllabus. But such concepts are considerably related with natural science concepts such as biodiversity conservation, utilization of power, environmental pollution and diseases. Although geography is studied by all students at the level of certificate of secondary education in Tanzania, no study has been done to determine whether there is any significant difference in understanding levels between boys and girls on environmental concepts as specified in the geography syllabus.

1.1. Theoretical Framework

Many of the environmental problems are the result of irresponsible environmental behaviour, which is highly influenced by the attitudes people possess (Ramsey and Rickson, 1976; Meinhold and Malkus, 2005). In other words, people's decision making is also guided by the values and attitudes they possess (Rennie, 2005;2007). Environmental attitudes are therefore a big concern in significant environmental education research (Eagles and Demare, 1999; DiEnno and Hilton, 2005; Lee, 2008). In this argument, promoting favourable attitudes towards environment has been seen as one of the goals of environmental education (Mutisya *et al*., 2013). Research demonstrates that formal environmental education helps students to develop more favourable attitudes towards environment (Ramsey and Rickson, 1976; Bradley *et al*., 1999). This is the reason why countries like Tanzania decided to integrate environmental education in their school curriculum. Teaching of environmental management concepts integrated in the school curriculum assumes that boys and girls will have equal chance of understanding such concepts. But this is not necessarily the case because according to the theory of planned behavior, what an individual does is determined by personal motivation which is determined by attitude, social support and perceived behavioural control. These factors are grounded by the persons'perception of social, personal, and situational consequences of the specified action (Ajzen and Fishbein, 1980; Ajzen, 1985).

In the context of environmental management, there are several factors grounded by the perceived social, personal, and situational consequences that determine the actions or behavior of boys and girls. For instance, in developing countries such as Tanzania girls are made to carry out most of all the sweeping and cleaning activities; they are called upon more than their male counterparts to perform cleanliness maintenance tasks at home or in schools. Such unequal treatment between boys and girls sets a different socialization patterns between boys and girls leading to varied attitudes towards environmental problem between the two sexes (Raudsepp, 2001; Diamontopoulos *et al*., 2003). For example, Raudsepp (2001) found that women were significantly more likely than men to be concerned with environmental problems. Other studies indicate that girls had significantly higher level of favourable environmental attitudes than boys (Muttaqui, 1983; Mittelstaedt *et al*., 1999; Mutisya *et al*., 2013). This is by considering the observation that women tend to be more sustainable consumers as they are more likely to recycle, buy organic food and eco-labeled products and place a higher value on energy-efficient transport (Organization for Economic Cooperation and Development (OECD), 2008).

However, these favorable environmental attitudes among girls and women are cultural practices which may be difficult to be reinforced through formal curriculum. For instance, it has been observed that boys are more likely than girls to choose science subjects to study in higher education and to have more positive attitudes towards science generally (OECD, 2007). This means, more girls than boys will have less exposure to science based environmental management concepts. If it is also considered that women represent more than 70% of the world's poor due to unequal access to economic opportunities in both developed and developing countries (OECD, 2008) and that increased environmental knowledge may help improve environmental attitudes (Ramsey and Rickson, 1976; Bradley *et al*., 1999) one may predict that women especially in the developing countries will be more vulnerable to the cotemporary environmental problems such as global warming and climate change not only because of the gender roles but also due to their limited opportunity to be exposed to the scientific strategies of adapting and mitigating

climate change. This is demonstrated by the observation that women represent an untapped asset in coping with the effects of climate change on livelihoods and providing relief in the event of natural disasters (UNEP, 2004).

Considering livelihoods, it should be noted that women tend to play a greater role in natural resource management and ensuring nutrition (FAO, 2008). As a consequence, responsibility for adapting the effects of climate change is likely to lie mainly on the side of women than men including finding alternative ways to feed their family (CIDA, 2002). In the event of natural disaster women and children are far more likely to die than men during extreme weather events linked to climate change owing to their greater vulnerability (Mirza, 2003). Women and girls' particular vulnerability is due to a combination of factors, including differences in socialization where girls are not equipped with the same skills as their brothers, such as swimming and tree climbing (Brody *et al.*, 2008) These observations pose the necessity for empowering girls and women on management of environmental resources under the existing environmental problems. However, this conclusion does not undermine the same necessity of environmental education and knowledge on climate change to boys and men because there are circumstances where men are equally vulnerable. For example, more men died than women during Hurricane Mitch in Bangladesh. It has been suggested that this was due to existing gender norms in which ideas about masculinity encouraged risky, 'heroic' action in a disaster (Röhr, 2006). Also, there is less likelihood that more men than women would support more drastic policies and measures on climate change.

Other actions or behavior of boys and girls determined by social and situational consequences can be explained on the basis of their negative environmental impacts. This is by considering men's lifestyles and consumer patterns, whether they are rich or poor tend to be more resource-intensive and less sustainable than women's (Johnsson-Latham, 2007). For example, while women use public transportation, even in households with cars, more often than men and travel short distances closer to home, men more often travel in their own car and for greater distances (Johnsson-Latham, 2007; Björnberg and Hansson, 2013). Also, men both earn and spend more than women and their purchases tend towards more expensive capital goods such as homes, cars and electronics. These are unlike women activities such as shopping, food preparation, gift-buying, and disposal of used items (OECD, 2008). In addition, women spend more than men on consumer goods, including in the categories of hygiene, medical care and health, clothing and shoes, books and culture while men are more likely to eat out than women, consume more alcohol and tobacco, and spend more on transport and sport (WEN, 2007).

From the theoretical framework it can be established that individual actions are driven by personal motivation. Personal motivation to do or act in a certain way is determined by one's attitudes and social cultural practices which can be distinguished between boys and girls or between men and women. This means mans role on the environment or knowledge about environmental resources differ by gender. However, it has been observed that there is very small gender difference in students' performance in science though greater proportion of questions requiring higher-level competency favours boys in mathematics and girls in reading (Close and Shiel, 2009; Lafontaine and Monseur, 2009). Also, especially in the later years at school, socio-cultural factors such as career and occupational choices and aspirations may influence the performance of boys and girls differently (EACEA, 2010). Therefore one cannot easily say whether there is similar understanding levels of environmental education concepts integrated with the school curriculum or not unless a study is done.

2. Methodology

The purpose of this study was to determine whether there was any significant difference in understanding levels between secondary school boys and girls on the concepts of environmental degradation, meteorology and climate change. The study sought to test the hypothesis: *There is no any significant difference in students' level of understanding on the concepts of environmental degradation, meteorology and climate change between boys and girls.*

The study involved 480 form four students from 12 secondary schools in Morogoro region, who were randomly sampled. The data were mainly collected through structured survey and interviewees. The questionnaire which was used to collect data during the survey had items which sought to elicit information from students on their understanding of the concepts of environmental degradation, weather and climate and climate change as specified in the Certificate of Secondary Education syllabus in Tanzania. In addition, focus group discussions were conducted in order to allow the respondents express their in-depth understanding of the concepts of environment, in addition to the information they filled in the questionnaire. A total of twelve focus group discussions were conducted: one for each school. Each focus group discussion lasted for 1-2 hours in which both researchers facilitated the discussion and recorded the required information.

The quantitative data collected through structured survey were analyzed using SPSS computer program, version 16 in which frequencies of students' responses on the understanding of the concepts of environment were computed. Chi-square statistical analysis tool was run in order to establish whether or not a significant difference in understanding levels between the boys and girls existed. Responses from focus group discussions were used to complement the data collected through structured survey.

3. Findings

Findings are presented in two main categories. The first category is based on environmental degradation such as concepts of air pollution, waste management and power use whereas the second category focuses on meteorological concepts such as weather, climate and climate change. Tables in this section show the number of respondents whereas the numerals in the brackets represent the percentages of respondents.

Causes of Green House Gases. Comparison between boys' and girls' understanding of the causes of green house gases revealed that more boys 229 (47.7%) than girls 197 (41%) understood that industries and automobiles contributed to the highest concentration of green house gases in the atmosphere compared with other human activities (Table 1).

Table-1. Students' Responses by Sex on the Causes of Green House Gases

Sex	Causes of green house gases			
	Domestic wastes	**Industries and automobiles**	**Agricultural activities**	**Natural disasters**
Males	5(1)	229(47.7)	5(1)	8(1.7)
Females	8(1.7)	197(41)	9(1.9)	15(3.1)

Note: Numbers in the bracket represent percentages

However, chi-square analysis shows that the difference in understanding levels between boys and girls about the causes of green house gases was statistically not significant (Chi-square=4.911, df=3, p=0.178>0.05).

Prominent Gas for Global Warming. On this aspect, it was revealed that more boys 126 (26.3%) than girls 91 (19%) were knowledgeable about the role played by carbon dioxide in global warming (Table 2).

Table 2. Students' Responses by Sex on the most prominent gas for global warming

Sex	Causes for global warming			
	Carbon monoxide	**Sulphur dioxide**	**Methane**	**Carbon dioxide**
Males	93(19.4)	22(4.6)	9(1.9)	126(26.3)
Females	101(21)	23(4.8)	15(3.1)	91(19)

Also, one of the items in the questionnaire which sought to elicit responses on gases which cause global warming showed that more girls than boys indicated carbon monoxide, methane and sulfur dioxide as important gases for global warming, which is wrong(see Table 2). But the chi-square test analysis showed that the difference in the level of understanding between boys and girls on the most important gases for global warming was statistically not significant (Chi-square=6.676, df=3, p=0.083>0.05).

Similarly, Table 3 shows that the proportion of students who could identify that global warming is mainly due to human beings was slightly higher for boys 179(37.3%) than girls 152(31.7%).

Table-3. Students' Responses by Sex on the Agent for Global Warming

Sex	Agent for global warming			
	Natural disaster	**Human beings**	**Micro-organisms**	**Wild animals**
Males	62(12.9)	179(37.3)	7(1.5)	2(0.4)
Females	57(11.9)	152(31.7)	16(3.3)	5(1)

Also, a significant proportion of boys were attracted with wrong alternatives as shown in Table 3. But, the difference was not statistically significant as shown by Chi-squire test analysis (Chi-square=6.398, df=3, p=0.094>0.05).

Simple methods for wastes control. With regard to students' understanding of the simplest means of waste control that an ordinary person could do, there was a greater number of both boys and girls who were attracted by the wrong alternatives "Re-cycling and re-using materials" than the rest of the alternatives (Table 4). Nevertheless, the correct response "Reducing and re-using materials" was chosen by a greater number of boys (14.6%) than girls (8.8).

Table-4. Students' Responses by Sex on the simple methods for wastes control

Sex	Easily to reduce wastes			
	Re-cycling and re-using materials	**Re-cycling and re-ducing materials**	**Reducing and re-using materials**	**Re-cycling and removing materials**
Males	94(19.6)	44(9.2)	70(14.6)	42(8.8)
Females	97(20.2)	46(9.6)	42(8.8)	45(9.4)

However, the Chi-square test analysis showed that the difference in the level of understanding between boys and girls on the simple methods for wastes control was statistically insignificant (Chi-square=7.317, df=3, p=0.120>0.05).

The most utilized source of power and its effect on the environment. On this aspect, there were a greater proportion of boys than girls who could identify that "oil" is the most utilized source of power than the other sources. Table 5 indicates further that there was a greater number of girls than that of boys who chose the wrong alternatives.

Table-5. Students' responses on the most utilized source of power

Sex	Most utilized source of power			
	Oil	**Solar energy**	**Hydro-electricity**	**Coal**
Males	92(19.2)	65(13.5)	66(13.8)	27(5.6)
Females	49(10.2)	78(16.3)	70(14.6)	33(6.9)

Also, The Chi-square test analysis shows that the boys' understanding level about the most utilized source of power was significantly higher than that of girls (Chi-square=14.204, df=3, p=0.003<0.05).

Table 6 shows that the proportion of boys (34%) who could identify that coal and oil are the major sources of power which contribute to green house gases in the atmosphere is higher than that of girls (20.6%).

Table-6. Students' Responses by Sex on the Major Sources of Power Production that Produce green house gases

Sex	Sources of power producing green house gases			
	Oil and Solar energy	Solar energy and hydroelectricity	Hydroelectricity and coal	Coal and oil
Males	21(4.4)	42(8.8)	24(5)	163(34)
Females	20(4.2)	78(16.3)	33(6.9)	99(20.6)

Also table 6 indicates that all the wrong alternatives for the item attracted more girls than boys. Chi-square test analysis shows that such a difference in understanding about the sources of power for green house gases production between boys and girls was statistically significant (Pearson Chi-square=27.667, df=3, p=0.000<0.05).

Table 7 shows that there was greater proportion of boys than that of girls who could relate power use with various environmental problems such as global warming, climate change and air pollution. This is further justified by the observation that the proportion of girls (33.5%) who responded wrongly that power use is directly related with soil erosion is greater than that of boys (16.9%).

Table-7. Students' responses on the environmental problem which is not related with power use

Sex	Power production not related with			
	Global warming	Soil erosion	Climate change	Air Pollution
Males	10(2.1)	161(33.5)	58(12.1)	21(4.4)
Females	33(6.90	94(16.9)	66(13.8)	37(7.7)

Chi-square test analysis shows that the boys' understanding level on the environmental problem which is not related with power use was significantly higher than that of girls (Pearson Chi-square=34.062, df=3, p=0.000<0.05).

The study established further that there was a greater proportion of girls than that of boys who could not relate our daily life with power use by the observation that 37.3% of boys could realize that every one of us should be responsible with power use compared to127 26.5% girls (Table 8).

Table-8. Students' Responses by Sex on who is Responsible for Minimizing Power Use

Sex	Responsible for minimizing power use			
	The government	Members of parliament	Power experts	Every one of us
Males	26(5.4)	10(2.1)	35(7.3)	179(37.3)
Females	15(3.1)	16(3.3)	72(15)	127(26.5)

Chi-square test analysis shows that the boys' understanding level on who should be responsible with minimizing power use was significantly higher than that of girls (Pearson Chi-square=25.870, df=3, p=0.000<0.05).

3.1. Weather and Climate

Parameters used in forecasting. Considering the total number of boys and girls; i.e. 250 boys and 230 girls, table 4.13 shows there is greater proportion of boys than girls who could not identify the elements which are not used in forecasting compared to girls (Table 9).

Table-9. Students' Responses by Sex on the Parameters not used in Forecasting

Sex	Parameters not used in forecasting				
	Force of gravity and earth rotation	Force of gravity	Earth rotation	Elements included	None
Males	66(13.8)	46(9.6)	47(9.8)	75(15.6)	16(3.3)
Females	62(12.9)	45(9.4)	39(8.1)	76(15.8)	8(1.7)

Likewise, there was a greater proportion of boys than girls who wrongly indicated that humidity and atmospheric pressure are not used in weather forecasting. The Chi-square test analysis shows that there was a significant difference in understanding about the elements used in forecasting between boys and girls (Chi-square=2.725, df=4, p=0.605>0.05).

Reliability of weather forecast. There was no clear cut difference on reliability of weather forecast information as perceived by boys and girls because while there were more girls than boys responding that weather forecast is "very unreliable" and "unreliable", there were similar proportions of responses for "reliable" and very "reliable" (Table 10).

Table-10. Students' perception by Sex on the Reliability of Weather Forecast

Sex	Reliability of weather forecast				
	Very unreliable	Unreliable	Somehow reliable	Reliable	Very reliable
Male	4(0.8)	19(4)	168(35)	49(10.2)	10(2.1)
Female	11(2.3)	19(4)	141(29.4)	47(9.8)	12(2.5)

Chi-square test analysis shows that there was no significant difference in views about reliability of weather forecasting information between boys and girls students (Pearson Chi-square=5.025, df=4, p=0.285>0.05).

*Rate of seeking for weather forecast information.*When focusing on sex the rate of seeking for weather forecast information seems to be lower for girls than that of boys (Table 11).

Table-11. Students' Responses by Sex on the Rate of Seeking for Forecasting

Sex	Rate of seeking for forecasting			
	Once a day	**More than once a day**	**Rarely**	**Not at all**
Males	67(14)	67(14)	101(21)	15(3.1)
Females	53(11)	57(11.9)	106(22.1)	14(2.9)

One of the reasons revealed through focus group discussion was that, normally boys have more extra time after school hours compared to girls who may be occupied with home activities especially for the case of day scholars. So boys could use such extra time listening to weather forecast information. However, chi-square test analysis shows that there was no significant difference in the rate of seeking for weather forecast between boys and girls students (Pearson Chi-square=1.765, df=3, p=0.623>0.05).

Rate of seeking for weather forecast information between boys and girls could not be related with the extent of understanding weather forecast because there was a greater proportion of girls than boys who believed that they understand every weather forecast information (Table 12).

Table-12. Students' Responses by Sex on the Extent of Understanding Weather Forecasting

Sex	Extent of Understanding weather forecasting		
	Every information	**Some information**	**I don't understand any information**
Males	30(6.3)	199(41.5)	37(7.7)
Females	37(7.7)	178(37.1)	15(3.1)

Also, Table 12 further shows that there were more boys than girls who believed that they did not understand any weather forecast information.

Chi-square test analysis shows that there was a significant difference in proportions of students who indicated that they understood weather forecast information between boys and girls (Pearson Chi-square=2.787, df=2, p=0.426>0.05).*Ability to Measure the Elements of Weather.*Comparison between boys' and girls' perception on their ability to measure the elements of weather shows that there is a greater proportion of boys than girls concerning their ability to measure all the elements (Table 13).

Table-13. Students' Responses by Sex on their Ability to Measure the Elements of Weather

Sex	Ability to measure				
	Only temperature	Some of them	Most of them	All of them	None of them
Males	70(14.6)	68(14.2)	11(2.3)	9(1.9)	92(19.2)
Females	84(17.5)	37(7.7)	6(1.3)	6(1.3)	97(20.3)

Also there were more girls than boys' students who believe that they could not measure any of the elements of weather. Chi-square test analysis shows that there was a significant difference in students' believes regarding their ability to measure the elements of weather between boys and girls (Pearson Chi-square=11.815, df=4, p=0.019<0.05).

Climate Change

*Relationship between power production and climate change.*Comparison between boys and girls students in Table 14 indicates that there is greater number of girls than boys who could not identify that power production is related with global warming, climate change and air pollution.

Table-14. Students' Responses by Sex on the Factors Unrelated to Power Production by Sex

Sex	Power production is not related with			
	Global warming	**Soil erosion**	**Climate change**	**Air Pollution**
Male	10(2.1)	161(35.5)	58(12.1)	21(4.4)
Female	33(6.9)	94(19.6)	66(13.8)	37(7.7)

The difference between boys' and girls' understanding levels on the factors of climate change that are related with power production is statistically significant as shown by chi-squire test analysis (Pearson Chi-square=34.062, df=3, p=0.000<0.05).

This observation was justified further through focus group discussion where it was revealed that greater proportion of students who thought that factors causing global warming are different from the factors for climate change is for girls than boys. Never the less, such observation does not mean that boys understand the concept of climate change better than girls because comparison between boys and girls in Table 15 shows that proportion of students who could not give an idea of what climate change is was higher for boys than girls.

Table-15. Students' Responses by Sex on their Knowledge of Climate Change

Sex	Could define climate change		
	Well defined	**Idea given**	**No Idea**
Males	1(0.2)	33(6.9)	216(45)
Females	4(0.8)	27(5.6)	199(41.5)

Also, Table 15 shows that there were more girls than boys who could define climate change. But chi-square test analysis shows that there was no significant difference in understanding the concept of climate change between boys and girls students (Pearson Chi-square=4.386, df=2, p=0.495>0.05).

*Climate Change adaptation.*Table 16 shows that proportion of boys' students that could identify effective utilization of weather and climate information as one of the means for climate change adaptation was higher than that of girls' students.

Table-16. Students' Responses by Sex on How to Adapt Climate Change

Sex	How to adapt climate change			
	Effective utilization of weather and climate information	**Effective dilution of green house gases**	**Effective means of identifying clouds**	**Effective means of using solar energy**
Males	97(20.2)	74(15.4)	29(6)	50(10.4)
Females	89(18.5)	76(15.8)	37(7.7)	28(5.8)

But chi-square test analysis shows that there was no significant difference in understanding an effective means of adapting climate change between boys and girls (Pearson Chi-square=8.392, df=3, p=0.078>0.05).

Likewise Table 17 shows that proportion of boys who believe that every one of us is responsible for climate change is greater than that of girls.

Table-17. Students' Responses by Sex on who is Responsible for Climate Change

Sex	Responsible to adapt climate change			
	The government	**Environmental experts**	**Weather and climate experts**	**Every one of us**
Males	2(0.4)	5(1)	47(9.8)	196(40.8)
Females	5(1)	8(1.7)	63(13.1)	154(32.1)

The difference seems to be statistically significant through chi-squire test analysis (Pearson Chi-square=8.527, df=3, p=0.036<0.05). This observation can be related with power use in Table 8 where there was a greater proportion of girls than that of boys who could not relate our daily life with power use.

4. Discussion

The findings indicate that boys' understanding level on the concepts related to global warming such as a prominent gas for global warming, activities which produce green house gases and agents for global warming was significantly higher than that of girls. Through focus group discussion it was revealed that more girls than boys were unable to relate production of green house gases and global warming. Furthermore, it was revealed that girls were less interested in the way green house gases interact with the atmospheric components to bring about global warming as such concepts were mostly related to Chemistry; a subject which most girls in the surveyed schools avoided. The findings agree with the available literature that although there has been a decreasing rate of students who join science subjects, the rate of decrease is more pronounced for girls than boys (UNESCO, 2009)). The observed higher ability for girls to identify elements which are used in weather forecasting compared to boys in Table 9 implies that the girls' understanding level about concepts which are not directly linked with natural sciences could be higher than that of boys.

Although studies indicate that formal environmental education helps students to develop more favorable attitudes towards environment (Ramsey and Rickson, 1976; Bradley *et al.*, 1999) such environmental education may not equally benefit both boys and girls in Tanzania where the attitudes towards science differ between boys and girls. This is because many of the environmental problems are the result of irresponsible environmental behaviour, which is highly influenced by the attitudes people possess (Ramsey and Rickson, 1976; Meinhold and Malkus, 2005). For instance, there was significantly a greater number of girls than that of boys who could not demonstrate an understanding that everybody should be responsible in the reduction of power use as one of the strategies for environmental management (See Table 8 and 17).

In addition none of the students from the surveyed schools had ever practiced measuring the elements of weather since such schools did not possess the equipments for measuring the elements of weather. However, there was a significantly greater number of boys than girls who believed that they could measure the elements of weather (Table 13). The reason for this observation could be associated with the fact that girls thought that issues pertaining to measurement are difficult because they are typical activities for learning natural science subjects. Under such conditions, it becomes difficulty for girls to develop interest in the use of data from measurements of the elements of weather.

5. Conclusion

Integration of the concepts of meteorology and environmental education in the school curriculum is an important milestone in raising awareness of students on the important concepts of environmental management. But similar efforts of raising girls' interest towards natural science subjects are equally necessary so that both boys and girls can have the opportunity for acquiring the necessary knowledge, skills and attitudes for environmental management. The necessity becomes more pronounced considering that women need to take a leading role in climate change mitigation and adaptation strategies because of their known interactions with the environment through food production and extraction of other resources, including fuel wood.

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