Education for Sustainable Development: Pre-Service Teachers' Knowledge and Understanding

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Abstract
The professional development of teachers in Education for Sustainable Development (ESD) has been identified as 'the priority of priorities.' But unfortunately, in some developing countries like Nigeria, teacher education is seen as a key strategy that is yet to be effectively utilized to embed education for sustainable development in school system. Sustainable development is one of the greatest challenges of 21st century for all disciplines and over the past three decades there has been redevelopment of curriculum in many of the developed nations in the world consistent with the ideology of "education for sustainable development". This study investigates pre-service teachers' knowledge and understanding of education for sustainable development in Nigeria. The study also compares the understanding of those in science discipline with their counterparts in other disciplines as in arts and social sciences. Results revealed lack of adequate knowledge of ESD and variation in terms of understanding based on pre-service teachers' area of discipline. It is therefore recommended among others that ESD should be properly integrated into all existing teacher education programmes in order to reorient teacher education to address sustainability.

1. Introduction

In the bid to survive man is rapidly exposing the planet earth to the grave threat of climatic changes which poses problems to food, energy, politics and ecology security and together constitutes constraints to sustainable development (Wole, 2009). Nigeria as a nation is not excluded from the environmental consequences arising from anthropogenic variables as self-evident in the degradation of the ecosystems, loss of bio-diversity and decrease in agricultural produce. The Eastward rapid encroachment of the desert in Northern Nigeria poses threat to sustainable livelihood: and for the Niger Delta people it is 'hell on earth'', as cumulative practice of environmental degradation arising from pollution of land, air and water characteristic of oil exploration in Nigeria has made the region a flash point of conflict in the agitation for environmental justice and resource control (Agbu, 2005; Saka, Salau & Ali, 2007).

Erosion and life consuming flood have become a reoccurring decimal in the unfolding dynamics of environmental problems in Southern Eastern Nigeria. The 2012 floods that ravaged nearly 25 states with untold economic, social and political consequences clearly debunk the notion that Nigeria is insulated from such environmental problems (Jackson, 2013). All these expressly depict the need for sustainable development in Nigeria.

Sustainable Development (SD) is about maintaining and improving the quality of life without compromising the ability of future generations to meet their own needs (WCED, 1987). And SD is not limited to a concern for the natural environment or focused exclusively on

economic development. Rather SD is intended to encompass environment, economy, and social issues; but is often compartmentalized as an environmental issue. In its early manifestations, sustainable development was largely a green agenda, or bringing environmental considerations in economic development (John & Deborah, 2010).

UNESCO (2003) identifies four principles or conditions of sustainable development (SD) accompanied with associated educational skills for attaining them. The first condition is "recognition of the challenge"; this requires skills in "learning to know". Secondly, SD demands "collective responsibility and constructive partnership": the skill needed here is "learning to live together". The third condition for attaining SD is "acting with determination"; this calls for skills in "learning to do". The last principle of SD is "the indivisibility of human dignity"; with the educational task of "Learning to be". To implement these principles within the ESD framework, UNESCO (2003) highlights four domains which are basic education, reorienting existing education programs, developing public awareness and understanding of sustainability, and training. It is thus hoped that the implementation of the SD principles in concurrence with the associated educational tasks, within these four domains, would translate into sustainable living.

Teacher education institutions and teacher educators have been identified as key change agents in reorienting education to address sustainability. It is therefore expected to play a critical role in fulfilling the goals of the United Nations' Decade of Education for Sustainable Development (DESD) (de Ciurana & Filho, 2006; Ciegis & Gineitien, 2006). Since the beginning of the 21st century, there is a growing interest in and support for education for sustainable development in the developed world and much has been written about the need to reorient teacher education towards sustainability.

According to UNESCO (2005):

> *"Institutions of teacher education fulfill vital roles in the global education community; they have the potential to bring changes within educational systems that will shape the knowledge and skills of future generations. Often, education is described as the great hope for creating a more sustainable future; teacher-education institutions serve as key change agents in transforming education and society, so such a future is possible. Not only do teacher-education institutions educate new teachers, they update the knowledge and skills of in-service teachers, create teacher-education curriculum, provide professional development for practicing teachers, contribute to textbooks, consult with local schools, and often provide expert opinion to regional and national ministries of education. Institutions of teacher education also perform similar services for school principals who have significant impact on what occurs in schools. Because of this broad influence in curriculum design and implementation, as well as policy setting within educational institutions, faculty members of teacher-education institutions are perfectly poised to promote education for sustainable development (ESD). By working with the administrations and faculties of teacher education institutions, governments can bring about systematic, economically effective change." (p. 43-44)*

Education for sustainable development is lifelong process that leads to an informed and involved citizenry having the creative problem-solving skills, scientific and social literacy, and commitment to engage in responsible individual and co-operative actions. UK Panel for education for Sustainable Development (1998), states that education for sustainable development enables people to develop the knowledge, values, and skills to participate in decisions about the ways we do things, individually and collectively, locally and globally, that will improve the quality of life now without damaging the planet of the future. Education for sustainable development is a holistic approach for school's management and the curriculum, not a separate subject. It therefore requires reflection on what to teach, and how to teach in order to foster learning that emerges from discovery and is relevant to the learner's life experiences

Loughran (2006) also looks at teacher education as the pre-service and in-service teacher preparation where student teachers seek to develop knowledge and skills of teaching and to learn how to competently apply these in practice. Education is an inevitable tool for sustainable development and the effectiveness of any educational system depends greatly on the educational attainment of teachers because no system of education can be qualitatively higher than the quality and commitment of its teachers.

McKeown et al., (2002) argues that ESD requires the implementation of a skills-oriented teaching paradigm in order to promote an ESD which goes beyond mere education about sustainable development. Such skills will allow learners to actively participate in shaping today's world and society in a sustainable fashion. Hence, Pre-service teacher education programs are therefore poised to addressing the issues of sustainability as they are well-situated to bring about a sustainable future by the dissemination of updated knowledge and skills which is inculcated to learners (Karpudewan, Zurida, & Norita, 2011). Powers (2004) also noted that pre-service teacher's curriculum possesses a multiplier effect where one teacher has the potential to impact a number of student taught throughout his/her career. But UNESCO noted this challenge:

> *"One of the great challenges of ESD is to have student teachers understand the interconnectedness of the environment, society and economy and have this interrelatedness be evident in their teaching and their lives as community members..." (2005, p. 43-44).*

An understanding of the principles of sustainability and the interdependence of the environment, the economy, and social systems in teacher education is paramount as it can help us learn to make the changes necessary to become effective stewards of natural resources and the environment (Erdogan & Tuncer, 2009). Therefore, it behooves educators to ensure that the interconnection between the environment, economy and social structures become an integral part of teacher education programmes.

It is a known fact that the education of school teachers plays a vital role in achieving changes in teaching and learning in schools. UNESCO-UNEP declaration related to learning for a sustainable development, namely, that of awareness and knowledge stated that

"*If teachers are to engage their students effectively in Education for Sustainability, it is a reasonable assumption that they should have an understanding of Education for Sustainability as a concept and a secure knowledge of key contemporary environmental issues (Taylor, Kenelly, Jenkins & Callingham, 2006, p.47).*

Teachers are important component of education whose services are important in the realization of educational goals all over the world. Due to their central role in the enterprise of education, it is important that prospective teachers, who are in a position to influence their students, begin their teaching careers with a clear understanding of ESD. But despite global focus on education for sustainable development since the beginning of the 21st century, it is obvious that Nigerian pre-service teacher education institutions and programmes are not doing all they can if anything at all to prepare teachers for teaching ESD. This study was therefore set out to draw attention towards knowledge and understanding of ESD by pre-service teachers (student teachers) as their role is central in teaching for sustainable development. Also, to determine whether pre-service teachers' understanding of ESD is influenced by their discipline.

2. Research Questions

This study answered the following questions:

1) What is the level of pre-service teachers' knowledge of ESD?
2) What is the level of pre-service teachers' understanding of ESD?
3) Does pre-service teachers' specialized discipline have influence on their understanding of ESD?

3. Methodology

A sample of 342 final year pre-service teachers participated in this study, comprising science education specialists, social science education specialists and arts education specialists from the Faculty of Education, University of Lagos, Nigeria. Purposive sampling technique was used to select the sample for this study because this set of students were well suited to provide information based on the purpose of this study revealing the extent of sustainable development issues and ESD being integrated and implemented in teacher education programmes.

The study used an adapted researched instrument from Alex, Heather, Christina & Maurine (2009) and was modified to suit the purpose of this study. The instrument consists of the following sections: Section A- comprised demographic information of the participants such as Discipline, Department, and year of study. Section B- this section requires participants to define the term Education for Sustainable Development (ESD). Section C- this section consists of 6-item questions soliciting participants' understanding of ESD using Likert-type scale comprising of three options: Disagree, Agree and Don't Know. The data collected were analyzed using frequency counts, simple percentages and bar charts.

4. Results

4.1 Pre-service Teachers' Knowledge of ESD

Table 1: Distribution of pre-service by discipline

Variable		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Science	114	33.3	33.3	33.3
	Social science	108	31.6	31.6	64.9
	Arts	120	35.1	35.1	100.0
	Total	342	100.0	100.0	

Table 2: Pre-service teachers' knowledge of education for sustainable development (ESD)

	Frequency	Percent	Valid Percent	Cumulative Percent
Incorrect	197	57.6	57.6	57.6
Inadequate	115	33.6	33.6	91.2
Correct	30	8.8	8.8	100.0
Total	342	100.0	100.0	

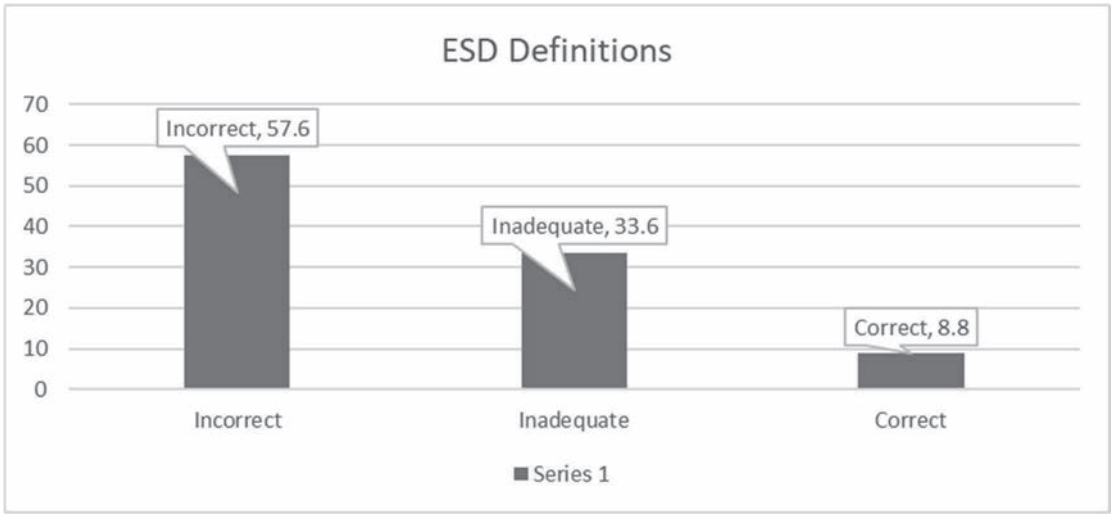

Figure 1: Pre-service teachers' knowledge of ESD

Table 3: Pre-service teachers' understanding of ESD

Item 1: Our planet has unlimited natural resources	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	207	60.5	60.5	60.5
Don't know	45	13.2	13.2	73.7
Agree	90	26.3	26.3	100.0
Total	342	100.0	100.0	
Item 2: It is for biological reasons that women often than men take care of housekeeping	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	176	51.5	51.5	51.5
Don't know	67	19.6	19.6	71.1
Agree	99	28.9	28.9	100.0
Total	342	100.0	100.0	
Item 3: Every individual in a society should receive education that teaches the knowledge, values, issues and skills for sustainable living.	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	21	6.1	6.1	6.1
Don't know	20	5.8	5.8	12.0
Agree	301	88.0	88.0	100.0
Total	342	100.0	100.0	
Item 4: There is no point in getting involve in sustainability issues since government and industries have all the power and can do what they think is right.	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	211	61.7	61.7	61.7
Don't know	15	4.4	4.4	66.1
Agree	116	33.9	33.9	100.0
Total	342	100.0	100.0	
Item 5: Education for sustainable development is all about environmental issues caused by scientific activities hence, should be integrated to science curricula only.	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	164	48.0	48.0	48.0
Don't know	83	24.3	24.3	72.2
Agree	95	27.8	27.8	100.0
Total	342	100.0	100.0	
Item 6: We cannot slow down the rate of climate change.	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	168	49.1	49.1	49.1
Don't know	68	19.9	19.9	69.0
Agree	106	31.0	31.0	100.0
Total	342	100.0	100.0	

4.2 Influence of Pre-service Teachers' Discipline on ESD Understanding

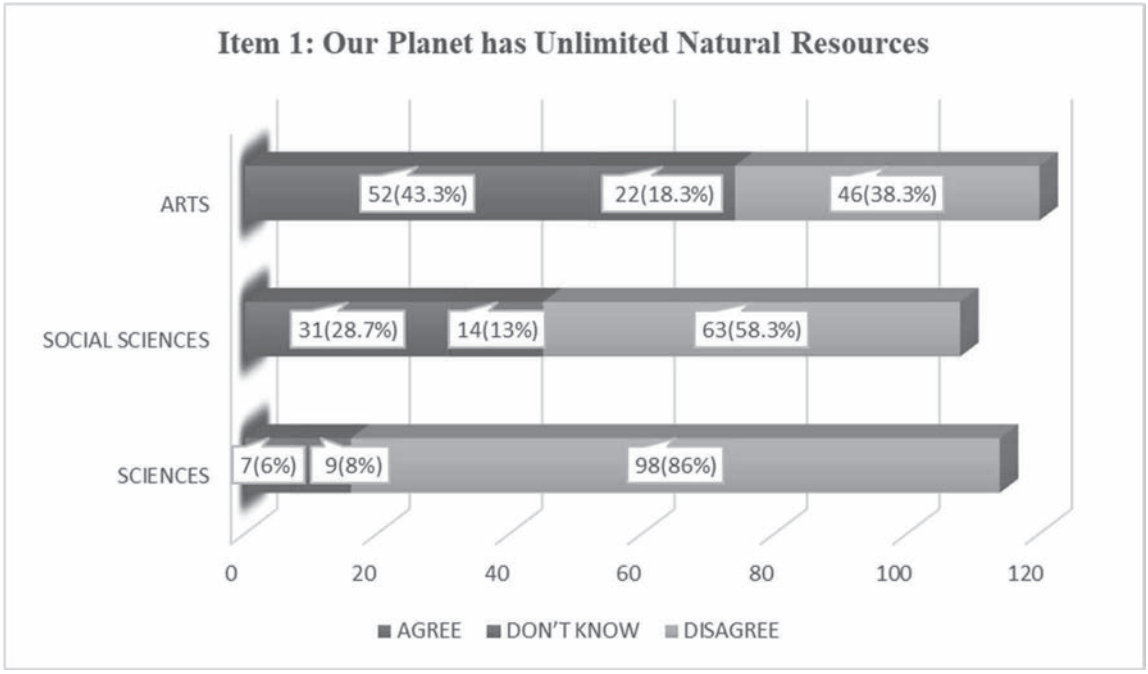

Figure 2: Pre-service Teachers' responses to Item 1

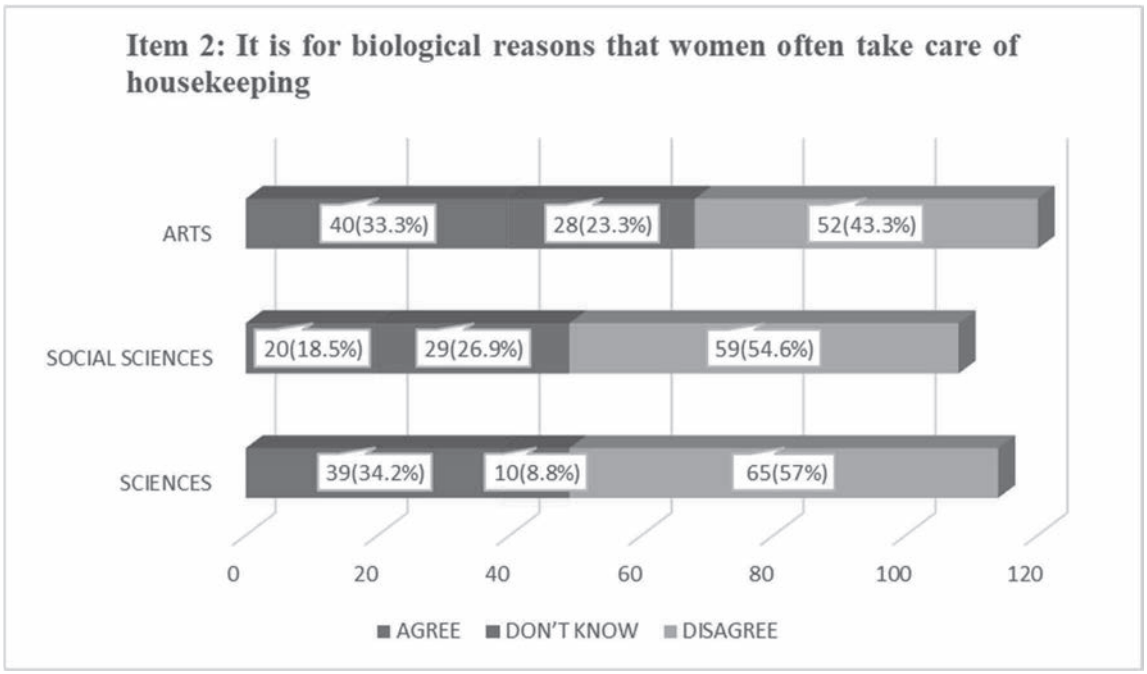

Figure 3: Pre-service Teachers' responses to Item 2

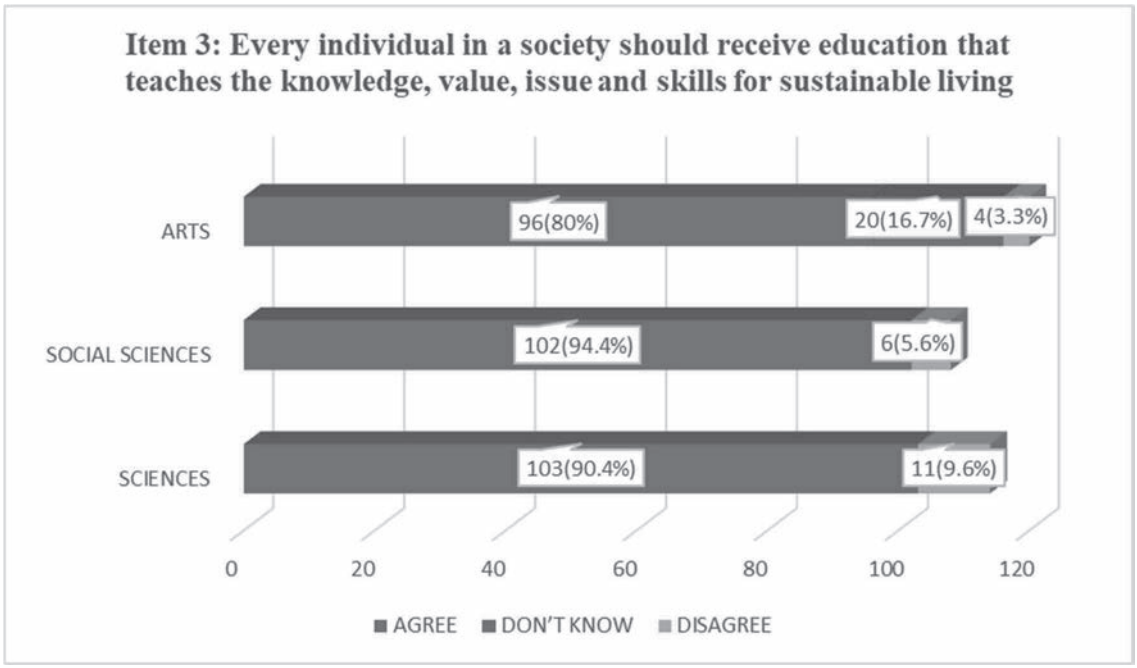

Figure 4: Pre-service Teachers' responses to Item 3

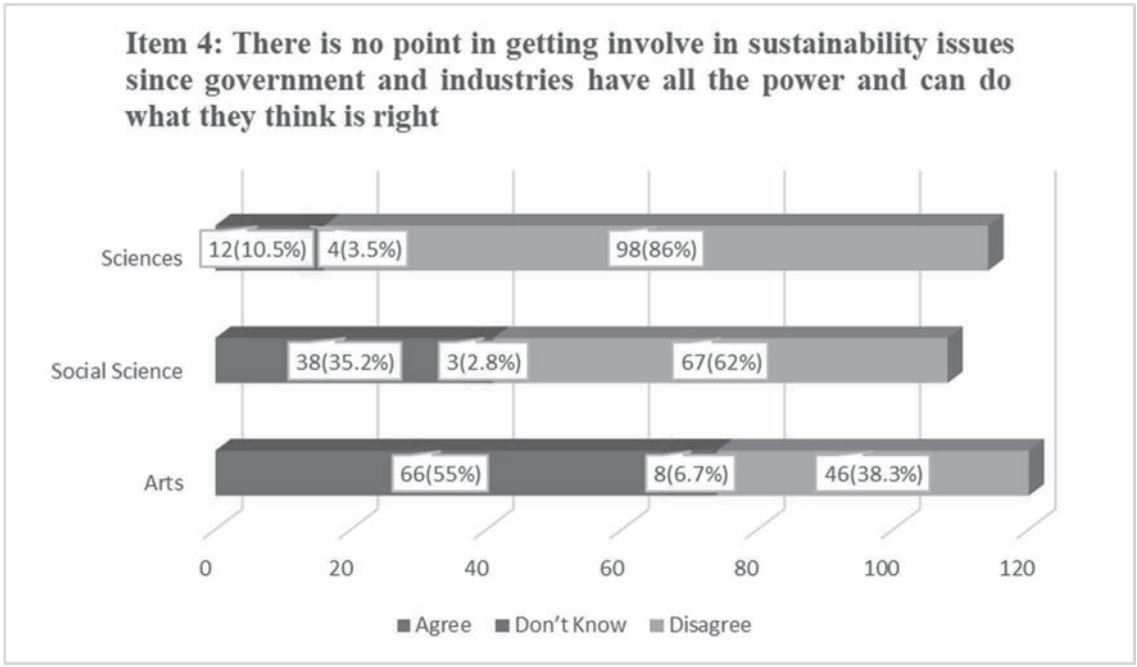

Figure 5: Pre-service Teachers' responses to Item 4

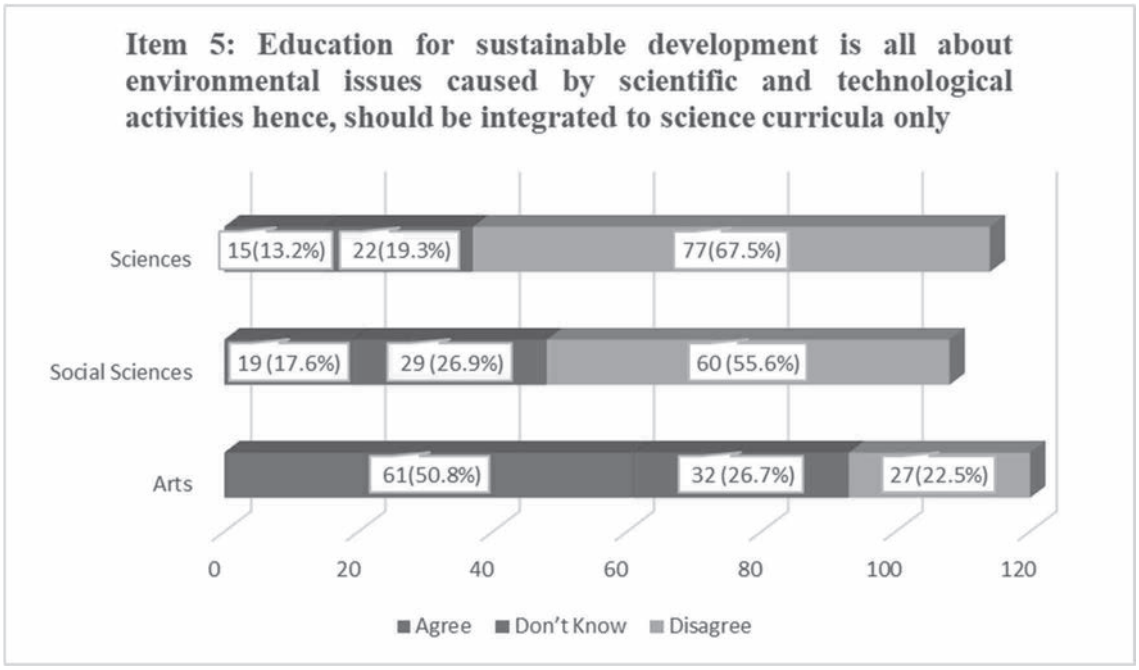

Figure 6: Pre-service Teachers' responses to Item 5

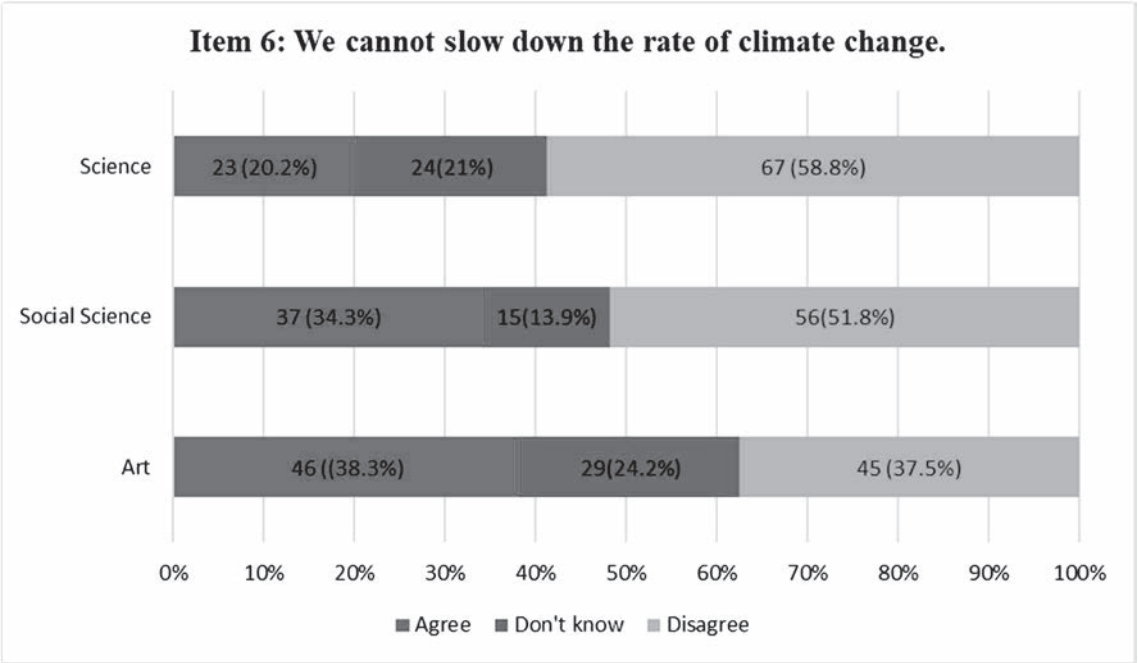

Figure 7: Pre-service Teachers' responses to Item 6

5. Discussion

5.1 Demographics

There are 342 participants in all; 114 (33.3%) of them were science pre-service teachers, 108 (31.6%) were from social science and 120 (35.1%) of them were from arts (see Table 1). From table 1b, 45% of the pre-service teachers were first year while the remaining 55% were in their final year i.e. fourth year.

5.2 ESD Knowledge

Table 2 shows the results from the undergraduate survey pre-service teachers, while most pre-service teachers did not define the term ESD correctly, majority also gave inadequate definition. The participants were requested to define the term "Education for Sustainable Development," based on the scope of the expressions, their responses were classified as 'correct', 'inadequate', and 'incorrect' by the researcher. From table 2 and Figure 1, only 8.3% could give the correct definition, while 33.6% gave inadequate definition and those with incorrect definition has the highest percentage (57.6%). Interestingly, majority of those with inadequate definition defined ESD from the environmental perceptive. This implies that environmental perspective is single out by most pre-service teachers as integral to the concept of sustainable development. In summary, since majority of the Pre-service teachers could not define the term correctly, this typically show no adequate knowledge of ESD. This finding is in agreement with UNESCO (2005) submission that ESD faces the challenge of having pre-service teachers understand the interrelatedness of the environment, society, and economy. This calls for urgent reforms in teacher education curricula with a more thorough orientation around ESD.

5.3 ESD Understanding

Table 3 shows that the majority of the participants (60.5%) disagreed that earth has unlimited resources and about half of the pre-service teachers also disagreed that biologically women should take care of housekeeping. Although, the highest percentage (88) of the pre-service teachers believed that every individual in a society should receive education that teaches the knowledge, values, issues and skills for sustainable living but only 61.7% disagreed with the statement '*item4: There is no point in getting involve in sustainability issues since government and industries have all the power and can do what they think is right'*. This shows that they did not have adequate knowledge and understanding of the relationship that exist between sustainable living and getting involve in sustainability issues. Less than half of them (48%) disagreed with the statement *"item 5: ESD is all about environmental issues caused by scientific activities hence, should be integrated into science curricula only"* This result shows that majority of the pre-service teachers see ESD as environmental issues and this reveal why their definitions of the term ESD reflect more of environmental perspective. Interestingly, only 49.1% disagreed with the '*item 6: we cannot slow down the rate of climate change* 'while the rest were either agreed (31%) or didn't know (19.9%).

5.4 Influence of Discipline

The results show that differences in the way ESD is understood are linked to the area of participants' discipline. As illustrated by Figures 2, 3, 4, 5, 6 and7, pre-service teachers in science discipline displayed more understanding than their counterparts in social science and arts respectively. The following items mostly discriminate pre-service teachers' understanding of ESD according to disciplines: Item 1 (Figure 2: *"Our planet has unlimited natural resources"),*

Item 4 *(Figure 5: "There is no point in getting involve in sustainability issues since government and industries have all the power and can do what they think is right"),* Item 5 *(Figure 6: Education for sustainable development is all about environmental issues caused by scientific activities hence, should be integrated to science curricula only")* and Item 6 *(Figure 7: "We cannot slow down the rate of climate change").*

A similar trend concerning the conceptions of ESD was shown in France by Lange (2008) from an inquiry of 165 pre-service teachers (of biology-geology, or physics-chemistry, or history-geography), the answers to a questionnaire being completed by 8 interviews and some focus groups. The results show significant differences among the disciplines.

6. Conclusion

This study points out to the need for teacher education to provide a holistic understanding of ESD including all the three perceptive. Teacher educators must also lead the way in providing ways to meet the needs of pre-service teachers in relation to ESD at the point of entry to their career in teaching and this call for new teaching processes less oriented to instruction and more oriented to action for sustainability. This is critical in fulfilling the aims declared by UNESCO (2005), wherein the teacher's role is of paramount importance to support sustainable development. Education for sustainable development promises to make the world a better habitable place for the present and future generations and this calls for giving learners knowledge and skills that will help them find new solutions on their environment, economic and social issues. But it is likely that ESD cannot be properly incorporated into curriculum and carefully implemented until ESD becomes an educational priority in developing countries like Nigeria.

Based on the findings in this study it is therefore recommended that teacher education institutes and departments should review their curricula in terms of their focus on ESD and plan for initiatives to educate pre-service teachers for sustainability. Also, ESD should be properly integrated into all existing teacher education programmes in order to reorient teacher education to address sustainability. Teacher educators should be motivated to find a way of weaving themes of sustainability and ESD pedagogies into all existing courses in all disciplines. Federal government through the Ministry of Education should put adequate professional training programmes in place in order to equip educators and teachers with knowledge about ESD

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