PERCEIVED EDUCATION COURSES THAT INCULCATE SUSTAINABILITY AWARENESS IN STUDENTS OF HIGHER INSTITUTION OF LEARNING IN NIGERIA.

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ABSTRACT

The Global demand for efficient use of natural resources in the production of the products of built environment sector prompted a serious concern to the industry practitioners and the academia. Thus, inclusion of courses that would enhance the expertise of trainees in the built environment related programmers in tertiary institutions of learning must be accorded utmost importance. Literature review has revealed that sustainability education and promoting awareness of it to students is crucial, hence focus on inclusion of sustainability principles and concept in curriculum of built environment programmes of institution of higher learning are crucial. The research aims to examine education courses that can be infused in the built environment programmes curriculum to help students understand the concepts of sustainability. The targeted groups of respondents are 500 level and HND II students of built environment in university and polytechnics. The survey design was adopted to gather data from 199 respondents representing 500 level and HND II students of built environment in Niger State, Nigeria. The data collected were subjected to descriptive statistics and Mann-Whitney test statistics on SPSS to examine the distribution for single variables and assess education coursework with highest score values and p-values. The survey analysis revealed that there are significant differences in agreement among students by level of education ($p>.05$) and found to be significantly higher for 500 level. It is concluded from the result that the most effective education courses to inculcate sustainability idea in students are environmental impact assessment, and design and sustainable development.

Keywords: Education courses, curriculum, sustainability, sustainable development.

INTRODUCTION

Sustainability education has been recognized as a key instrument to achieve the sustainable development, and has been emphasized as an important tool in increasing public awareness and understanding of sustainable development (United Nation, 2018). Institutions of higher education are essential stakeholders in fostering understanding and forging a way forward in achieving a sustainable future (Abubakar *et al.*, 2016; Ferrer-Balas, 2008). Universities all over the world are dedicated to achieving sustainability in terms of their operations, research, and curriculum (Hugé, 2018). Awareness among students for sustainability is generally associated with the environment, especially related to pollution (Malik *et al.* 2017). Having an awareness of sustainability among students can eventually contribute not only to understanding sustainability but also to contributing towards sustainable development. Providing sustainability awareness to students requires institution of higher learning to adapt sustainability principles in their teaching, and in particular their curriculum (Stough *et al.* 2018). As the sustainability concept is expanding in industry (Perez-Foguet *et al.*, 2018), the sustainable mindset of young graduates must be nurtured through sustainability education courses. Although efforts have been directed towards highlighting sustainability education's importance (Tejedor *et al.*, 2018), little attention has been given to investigating the inclusion of sustainability in technology education curriculum for students' competence development (Stough *et al.*, 2018). Addressing such key sustainable competencies among students is imperative to the construction industry. Therefore, there is a need to examine sustainability education courses for inclusion in the curriculum of universities and polytechnics construction related programs. This research aims to examine the education courses to be included in curriculum for promoting sustainability awareness and understanding

of stakeholders in construction industry. Against this backdrop that the paper seeks to; ascertain the courses to be included in the built environment programmes curriculum, and to establish the extent of agreement among students of built environment on courses to be included.

LITERATURE REVIEW

Education courses for promoting sustainability awareness and understanding of stakeholders in construction industry.

Sustainability concept and its practices in the technology development field are necessary for addressing the industry's current and future needs (Akins *et al.,* 2019). It is also specified that to address the concern of the industry an appropriate education curriculum should provide sustainability education to students of related field (Calafell *et al.,* 2019). Sustainability practices can be incorporated into the formal higher education institutions curricula by offering students the opportunity to become leaders for change through curriculum and operational innovation (Chalmers *et al.,* 2016). The promotion of Education for Sustainable Development (ESD) is taking place due to critical transition factors beginning with the acceptance of environmental principles, sustainable development perspectives through individual initiatives that policy-makers are aware of, new trans-disciplinary programs, networking, and whole-institution approaches that include practical green campus initiatives. Trans-disciplinary initiatives, changes in teaching and learning processes, and innovation in the content of university curricula may then occur (Dlouhá *et al.,* 2017). Working to build a whole-of-university educational programme that links the principles of sustainability being taught in the classroom with the principles of sustainability being implemented on the campus is one of the most tangible ways to help students see the connections between theory and practice and the relationship of their studies to the campus itself and to the broader world (Jennifer and Rob, 2009).

The university needs to develop quick and shorter procedures for curriculum development (Aderonmu, 2012). From these perspectives, the author suggest attention be drawn to sustainable art and crafts, ecology, energy conservation, Heat and Ventilation, Air conditioning, green architecture, energy efficient buildings, entrepreneurship, and affordable housing, water resources management, city architecture, renewable energy and eco-sanitation. Biedenwegk *et al.* (2013) explain education for sustainability in higher institutions as the education that prepares future professionals to be responsible citizens in a more sustainable society; however, little attention is given to instilling a deeper understanding of the ethical principles that provide the base for sustainability. Rather, sustainability education tends to involve students in practical activities such as campus greening initiatives, field visits to learn about sustainable practices and support to environmental studies courses or workshops. There are several studies in relation to sustainability in construction industry in Nigeria as established from the above body of literature; however, our study seeks to investigate the knowledge of students on education courses that can be integrated into the curriculum to help promote sustainability awareness for students of higher learning in Nigeria which many studies have overlooked.

METHODOLOGY

A survey of courses that promote sustainability awareness in students of higher institution of learning

Survey Design

The systematic random sampling technique was used to take representative sample from the heterogeneous population and proportional stratified sampling method was utilized to allocate

the total sample size to various fields of study. In order to address the research question: "What sustainability coursework be included in the built environment curriculum?" a questionnaire survey was undertaken. A total of 250 students from various fields were surveyed. The aim of the survey was to understand coursework to be included in education curriculum of built environment in universities and polytechnics and extent of agreement of students with regards to coursework to be integrated in curriculum. The survey aimed to portray the opinions and realities at different institutions with regard to their beliefs. The survey instrument was composed of 15 closed questions and structured in a way that it could gather information on the coursework. Table 1 and 2 presents the background information of students and courses covered in the questionnaire.

Table 1. Student demographics

General	Characteristics	Respondents	
Gender	Male	178	89.4
	Female	21	10.6
Age	15 – 20	10	5.0
	21 – 25	181	91.0
	26 – 30	6	3.0
	above 30	2	1.0
Level of education	500 level	99	49.7
	HND II	100	50.3
Course of Study	Architecture	60	30.2
	Quantity surveying	80	40.2
	Building Technology	56	29.6

Table 2 Coursework (Measurement Items)

	Questionnaire Items	**Scale**	**Reliability**
Please rate the extents to which you belief the following coursework in teaching be included in curriculum by putting a tick mark (" √") under: (Strongly Agree =5, Agree =4, Undecided =3, Disagree =2, Strongly Disagree=1.	Sustainable development economic, social and political structures Measuring sustainability Design and sustainable development Technology for sustainable development Sustainable materials and products Sustainable materials and products Fundamentals of sustainable construction and development The rationale for green buildings Energy efficiency in sustainable construction, building and design Sustainable job site operation Construction waste management and site protection Environment and social impact assessment	Strongly Agree =5 Agree =4 Undecided =3 Disagree =2 Strongly Disagree=1	

Data Analysis

A total of 199 students from various fields responded to the survey. The numerical data received from I99 students were analysed using SPSS 20 in order to perform descriptive statistics and inferential statistics. The descriptive statistic was carried out to examine the distribution for single variables. The Mann Whitney T-Statistics was conducted to determine the significance difference of students' opinion across educational levels. Mann Whitney Ranking Statistics was conducted to establish the direction of significance difference.
Descriptive statistics, Mann Whitney T-Statistics and Whitney Ranking Statistics were performed using the statistical package for social sciences (SPSS Version 20.0)

RESULTS AND DISCUSSION OF FINDINGS

What sustainability coursework should be included in the built environment curriculum?
Descriptive statistics was conducted to examine the distribution for single sustainability coursework's to be included in education curriculum. Table 3 reveals a general view of the students by educational level. From the analysis the most effective courses are: environment impact assessment ranked first (mean score value = 4.327), design and sustainable development was ranked second (mean value = 4.146), while fundamentals of sustainable development ranked third (mean score value = 3.950) construction waste management ranked fourth (mean score value = 3.789). While technology for sustainable ranked fifth (mean score value = 3.774), sustainable materials and products ranked sixth (mean score value = 3.704), sustainable job site operation ranked seventh (mean score value = 3.508), measuring sustainability ranked eighth (mean score value = 3.186), sustainable development ranked ninth (mean score value = 3.146) and rationale for green buildings ranked tenth (mean score value = 3.080). It is evident that mean score of courses to inculcate the idea of sustainability is within the range of 3.1-4.4. This implies that respondent strongly agreed the inclusion of nine education courses into curriculum as important technique for promoting student's awareness and understanding of sustainability principles. Similarly, energy efficiency course had mean score below 3.0, which signify that the respondents disagreed on the possibility of including it into curriculum. Finally, nine of the courses (variables) out of twelve had approximately 1.0 standard deviation; this implies inconsistency in agreement among respondents on rating the variables. But environment impact assessment and design and sustainable development are below 1.0 standard deviation; this implies consistency in agreement among respondents as coursework be included in the built environment curriculum.

Table 3: Descriptive statistics on Courses to be included in Built environment Curriculum

	N	Minimum	Maximum	Mean	Std. Deviation	Rank
Environment impact assessment	199	1.00	5.00	4.327	0.846	1
Design and sustainable development	199	1.00	5.00	4.146	0.855	2
Fundamentals of sustainable development	199	1.00	5.00	3.950	1.053	3
Construction waste management	199	1.00	5.00	3.789	1.437	4
Technology for sustainable development	199	1.00	5.00	3.774	1.458	5
Sustainable materials and products	199	1.00	5.00	3.704	1.282	6

Sustainable job site operation	199	1.00	5.00	3.508	1.381	7
Measuring sustainability	199	1.00	5.00	3.186	1.341	8
Sustainable development	199	1.00	5.00	3.146	1.249	9
The rationale for green buildings	199	1.00	5.00	3.080	1.335	10
Energy efficiency	199	1.00	5.00	2.834	1.262	11

What is the extent of agreement among students of built environment on inclusion of sustainability courses in the curriculum?

To establish the degree of inconsistency in agreement among respondents on the scoring of variables. The Mann Whitney T-Statistics was conducted in order to determine significance difference of students' opinion across educational levels. It was evidence from analysis in Table 4 that there is statistically significant difference by level of education (p >.05) on Sustainable development (p= .156), Design and sustainable development (p=.558) Energy efficiency as(p=.442), Sustainable job site operation (p=.512), Construction waste management (p=.338) courses.

Table 4: Educational Program Courses Mann-Whitney Test-Statistics

	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Sustainable development	4394.500	9344.500	-1.417	.156
Measuring sustainability	1598.000	6548.000	-8.455	.000
Design and sustainable development	4732.000	9682.000	-.586	.558
Technology for sustainable development	3409.500	8459.500	-4.016	.000
Sustainable materials and products	3217.000	8267.000	-4.434	.000
Fundamentals of sustainable development	3623.500	8673.500	-3.478	.001
The rationale for green buildings	3506.000	8556.000	-3.633	.000
Energy efficiency	4634.500	9684.500	-.803	.422
Sustainable job site operation	4692.000	9742.000	-.656	.512
Construction waste management	4584.000	9634.000	-.958	.338
Environment impact assessment	4220.000	9170.000	-1.984	.047

In addition to describe the direction of the significant differences by level of education (which group is higher) Mann Whitney Ranking Statistics was conducted as seen in Table 5. The results as rated by 500 level and HND II show that 500 level students surveyed strongly agree on technology for sustainable development (Mean Rank =115.56), sustainable materials and products (Mean Rank =117.51), fundamentals of sustainable development (Mean Rank =113.40),

the rationale for green buildings (Mean Rank =114.59), Energy efficiency (Mean Rank =103.19), Sustainable job site operation (Mean Rank =102.61), Construction waste management (Mean Rank 103.70), while HND II students surveyed strongly agree on Sustainable development (Mean Rank =105.56) ,measuring sustainability (Mean Rank 133.52), design and sustainable development (Mean Rank =102.18) and environment impact assessment (Mean Rank =107.30).

Table 5: Educational Program Courses Mann-Whitney Ranking Statistics

Level of education		N	Mean Rank	Sum of Ranks
Sustainable development	500 Level	99	94.39	9344.50
	HND II	100	105.56	10555.50
Measuring sustainability	500 Level	99	66.14	6548.00
	HND II	100	133.52	13352.00
Design and sustainable development	500 Level	99	97.80	9682.00
	HND II	100	102.18	10218.00
Technology for sustainable development	500 Level	99	115.56	11440.50
	HND II	100	84.60	8459.50
Sustainable materials and products	500 Level	99	117.51	11633.00
	HND II	100	82.67	8267.00
Fundamentals of sustainable development	500 Level	99	113.40	11226.50
	HND II	100	86.74	8673.50
The rationale for green buildings	500 Level	99	114.59	11344.00
	HND II	100	85.56	8556.00
Energy efficiency	500 Level	99	103.19	10215.50
	HND II	100	96.85	9684.50
Sustainable job site operation	500 Level	99	102.61	10158.00
	HND II	100	97.42	9742.00
Construction waste management	500 Level	99	103.70	10266.00
	HND II	100	96.34	9634.00
Environment impact assessment	500 Level	99	92.63	9170.00
	HND II	100	107.30	10730.00

Discussion of findings

Sustainability concepts if comprehensively covered in the offered curriculum of higher institutions of learning could help students to build capabilities to act as change agents to actively incorporate sustainability principles directly or indirectly in construction projects. Therefore, if sustainability is not adequately addressing in the curriculum and among students, it may contribute to failure of construction industry. To address the concern of the industry, it is opined that an appropriate sustainability education coursework be included in curriculum to provide students sustainability education related to their disciplines (Calafell, et al., 2019). It is observed that the current curriculum need be revisit in order to incorporate sustainability to enhance student's knowledge. The survey results firstly, identified coursework that incorporate sustainability to be included in curriculum as environment impact assessment, design and sustainable development, fundamentals of sustainable development, construction waste management, technology for sustainable, sustainable materials and products, sustainable job site operation, measuring sustainability, sustainable development and rationale for green buildings. Secondly, this study proved that there is statistically significant difference by level of education ($p > .05$) on sustainable design and sustainable development, energy efficiency, Sustainable job site operation, and construction waste management courses. Thirdly, 500 level students agreed

on technology for sustainable development, sustainable materials and products, fundamentals of sustainable development, the rationale for green buildings, Energy efficiency, Sustainable job site operation, Construction waste management, while HND II students agreed on Sustainable development, measuring sustainability, design and sustainable development, and environment impact assessment.

Conclusions

The research aims to identify courses on sustainability to be included in the study curriculum of institution of higher learning. A survey was used to identify the courses on sustainability to be included in education curriculum.

It was found that the most effective education courses to inculcate sustainability idea in students are environment impact assessment, and design and sustainable development. The survey analysis revealed that there are significant differences in education courses to inculcate sustainability idea in students by level of education ($p>.05$). Upon detailed analysis of result of Mann Whitney test statistics, it was found that agreement of students on education courses is significantly higher for 500 level. The survey analysis revealed general inconsistency in agreement among respondents on rating the variables. There is a need to include in education curriculum of built environment courses that promote sustainability awareness in students. The analysis of list of courses on sustainability was based on the available materials which limits the generalization of the findings to the whole students in higher institution of learning. This study comprehensively focused only final year students; however, the sample size was a limitation, which can be improved in future research. A similar study should be conducted to replicate these results in engineering and increase sample size. Future research should investigate extent of agreement on sustainability courses to be included in the education curriculum among students of engineering.

The outcomes of the present research have implications for quantity surveying practice. Firstly, the sustainable mindset of young graduates nurtured through sustainability education courses help to undertake sustainable project analysis during the Planning and design stage of a project.

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WOMEN QUANTITY SURVEYORS' PARTICIPATION IN THE CONSTRUCTION INDUSTRY

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ABSTRACT

Women possess skills and competencies that makes them relevant and gives them the capacity to fill in the skills shortage gap experienced in the construction industry. However, their participation in the industry is low especially in professional roles as they face difficulties affecting their recruitment and retention. Moreover, studies on women as professionals within the industry is scant. The participation of women Quantity Surveyors within the construction industry was explored. The study adopted a quantitative approach with structured questionnaire used to gather information from registered women Quantity Surveyors in the country. The data collected was analysed using the percentage and mean methods of descriptive statistics. The findings revealed that a high percentage of the women Quantity Surveyors studied are practising Quantity Surveyors who have worked on construction sites. However, women Quantity Surveyors still experience gender discrimination during recruitment. In order to overcome the myriads of difficulties faced, women take up jobs in firms with flexible work schedule rather than jobs in firms with rigid/hectic schedule. The study recommends that the government and Quantity Surveying bodies promulgate and enforce laws to mitigate gender discrimination during recruitment in both private and public organisations. The findings of this study provide insight into the participation of professional women; and will assist the professional bodies and researchers in the construction industry in exploring measures and policies that encourage women participation in the industry.

Keywords: Construction industry, gender discrimination, professional, skills shortage, women quantity surveyors.

INTRODUCTION

The construction industry provides economic growth and employment opportunities globally (Powell *et al*., 2007; Ratnasabapathy and Rameezdeen, 2007; Wibowo, 2009; Haupt and Harinarain, 2016); and embraces diverse activities, skills and products (Gurjao, 2006), while providing infrastructure and physical structures for other industries (Wibowo, 2009). It accounts for 7-10% of GDP in developed countries and 3-6% in developing countries (Lowe, 2003 cited in Wibowo, 2009). Globally, the industry employs 7% of the total world employment and 28% of industrial employment (Patel and Pitroda, 2016). In Nigeria, the industry employs 4-6% of the nation's workforce (Andawei, 2018; Jimoh *et al*., 2018), with more than three million people working as professionals, administrative staff, operatives and labourers (Adeyemi et al., 2006).

The industry is faced with a shortage of skills due to recruitment and retention difficulties (Powell *et al*., 2004; Sang *et al*., 2004; Ginige *et al*., 2007), blamed on the negative image of the industry as it is associated with poor, too physical and difficult working conditions (English *et al*., 2006; Ginige et al., 2007), brute strength, good tolerance for outdoor activities, inclement weather and bad language (Agapiou, 2002; Ksiazek and Nowak, 2017). To address the skills shortage and the gender imbalance already existing in the industry, Ginige *et al*. (2007) and Ksiazek and Nowak (2017) suggested that women should be recruited to fill the existing skill gap. Furthermore,

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