INTERNATIONAL SUSTAINABILITY UNIVERSITY EDUCATION FOR ARCHITECTURE, ENGINEERING AND CONSTRUCTION (AEC) COURSES: A CASE FOR GLOBAL CLASSROOM.

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ABSTRACT

Sustainability university education is targeted at social-environmental local problems to provide contextual solutions that have positive global impacts. As such, it is important for educational experiences of university students to be ascertain to close the gap between knowledge and skills for globalized sustainability education. However, not much has been pursued in the novelty of globalization of sustainability education, particularly in Nigeria. Yet, The Global Classroom for the globalization of sustainable education provides many opportunities for the global sustainability concerns. These opportunities include; global outlook to sustainable solutions, virtual educational technologies enhancement, established international standards and quality of students, promotes cross-cultural fluency, multiple and diverse partnerships and integration of sustainability practices into university educational experiences. A two sections questionnaire survey was conducted amongst 120 academic staff of Architecture, Engineering and Construction (AEC) professionals in a Nigerian University. The theoretical underpinnings were validated and the contextual challenges for a Global Classroom perceived includes; lack of constant electricity and internet, differences in time zones, language barriers, lack of virtual learning technology, lack of adequate sustainability knowledge and absent of regulations to support Global Classroom. This study concludes with deduced reflections on the necessary requirements for promoting Global Classroom as its recommendations, one of which is the promotion of institutionalized regulations to support Global Classroom.

Keywords: AEC, Education, Global Classroom, Sustainability, University

INTRODUCTION

Integrating sustainability has many local contextual challenges which include; climatic changes, poverty, loss of biodiversity, epidemics, and violent conflicts among communities. However, the underpinning causes do have a link with other communities both locally and globally, as such collaborative proactive actions are necessary for a global coordination and standards (Van der Leeuw et al., 2012; Wiek et al., 2013). As such, the future practices for a Sustainable Development (SD) by professionals in the Architecture, Engineering and Construction (AEC) are required to practice and collaborate across regions which have some challenges and prospects (Allu & Emuze, 2017). Furthermore, the expectations for global solutions through collaborative efforts have turned the search light to teaching and education (Brundiers & Wiek, 2011; Wiek et al., 2013). The study of Wiek et al. (2013, p.19) capsulise this position as follows:

“With these new teaching challenges, educators must determine how to best equip students with these trans-boundary competencies. Classroom exercises that present sustainability problems and solution options are an important part of such a competency-focused approach”.

In this study, the main concern is the university education of the AEC future professionals who are the actors in the built environment. The reasons being two-fold; firstly, sustainability research suggests that it is a problem which is social-environmental-technical in nature (Wiek et al., 2013; von Blottnitz et al., 2015; Sammalisto et al., 2015; Allu, 2018a). Secondly, it has been argued that the role of universities is significant for advancing sustainable development (Barth & Rieckmann, 2012; Allu, 2018b). According to Rieckmann (2012, p. 130)

“successfully integrated the application of the sustainable concept can develop into SD intelligence where the ESD knowledge has develop into systemic, anticipatory and critical thinking and actions for students to follow.”

Following up on the quotation by Rieckmann (2012), other studies also suggested that universities drive and motivate the transformational direction of their students and society at large (Barth & Rieckmann, 2012; Tilbury, 2013; Allu, 2018b). Despite the emphasis on integration of sustainability into socio-environmental and technical university education, there is still limited research on the perception of university staff on the subject (Karatzoglou, 2013 von Blottnitz et al., 2015; Allu, 2018b) and also in the Nigerian context (Allu, 2018a & b). Yet, it is expected that future professional competences of today’s students are the result of teaching received in higher education (Ludwikowska, 2019) and especially where sustainability is concerned (Sady, 2019). The global
classroom approach has a huge to impact the sustainable knowledge and future sustainable practices of today’s students.

This study presents Global Classroom as a means for global addressing the sustainability concerns deriving from the opportunities it provides to the educational systems and contextualizing it to the Nigerian university system.

LITERATURE REVIEW

Global Classroom and Education for Sustainable Development (ESD)

The Global Classroom (GC) deals with the internationalization of local solutions for educational programmes in sustainability. Thus, the university as a system is critical and change agent to any Sustainable Development (SD) transformation (Barth & Rieckmann, 2012). More particularly, for the environmental dimension of sustainability the onus lies with the architectural, engineering and construction (AEC) education (Watson et al., 2013; Altmont, 2014), where and institutional and social aspects are also encouraged (Segal et al., 2012). It is expected that, when these are successfully integrated, the future sustainable application would provide SD intelligence through the ESD knowledge which guides the systemic and individual development, anticipatory, critical thinking and actions students to follow naturally (Rieckmann, 2012). Hence, the more SD studies through ESD for capacity building are encouraged and called for (Tilbury, 2013; von Blottnitz et al., 2015 & Robert, 2016).

Global Classroom started at the Earth Institute, Columbia University, since 2008. Initially, the first GC addressed wide areas that includes; agriculture, economics, education, ethics, health and policy. Currently, it is specifically used to drive sustainable development practices through cross-disciplinary collaboration for sustainable solutions by many universities across the globe (Wiek et al., 2013; Tobal, 2019). This has been adopted by the universities because the sense of global citizenship in the approach for solutions promotes the students’ ability to overcome sustainability challenges holistically (Allu, 2018a and Tobal, 2019). Furthermore, sustainability education within the AEC promotes social-environmental-technical local problems and manifestations to have global solutions (Barkemeyer et al., 2014; Allu, 2019). The study by Wiek et al. (2013) further suggests that it important for educational experiences of students to confront challenges of crossing cultural, national, and international boundaries in a globalized world for easy understanding and uncovering the benefit the knowledge of the historical, epistemological and ethical underpinnings of these diversities (Homles et al., 2014 and von Blottnitz et al., 2015).

Following the discourse in the preceding paragraphs, the demand for ESD into the university system has over the years increased (Wiek et al., 2013; Robert, 2016; Allu, 2018a; Allu, 2019). As well as the expectations for universities across the globe to prepare students to develop their capacity to integrate sustainable options for every economic, socio-cultural and environmental challenges with a global applicable solution (Wiek et al., 2013; Allu, 2019).

Furthermore, the current Covid-19 pandemic has further given a push towards the option for virtual learning platforms and for sustainable actions by all human developmental processes. This is particularly so for betterment of skills, the education and supporting policy framework for AEC or the built environment professions (Oborn & Walters 2020). Integrating sustainability would enhance and contribute positively to the attainment of sustainable development goals which is certain to remain even the pandemic has been abated (Muse, 2020). According to Saxena (2020) integrating sustainability in the training of AEC places the future practitioners at an advantage in international placement.

Consequently, the onus is for the educators be to be knowledgeable on how best to guide their students with trans-boundary competencies are particularly achieved through the GC initiative as is the case in many developed economies (Wiek et al., 2013; Khandakar et al., 2020). According to Azeiteiro et al. (2015) sustainable education in higher learning through e-learning as GC is capable of sustainable transforming for the learner and transits into reforming the sustainable societal patterns. Yet, there is no certainty of the knowledge and understanding of the educators to position the future AEC professionals, in the Sub-Saharan African region and particular in the Nigerian context (Allu, 2018 and 2019).

The Global Classroom Challenges and Potentials

For every developmental initiative as much there may abound many potentials, there could also be some challenges, which may double as disadvantages. The challenges for GC are highlighted in Table 1, whilst Table 2 outlines the potentials of GC as opportunities. The contents of the two Tables guided the questions asked and the perceptions of the arrived were discussed to validate the theoretical findings. It can be deduced also from the
two Tables, that the potentials of GC far outweigh the challenges as postulated by earlier researcher who carried out similar research in this regard.

**Table 1. The challenges of Global Classroom**

<table>
<thead>
<tr>
<th>SN</th>
<th>Challenges</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Possible devaluation of local cultural content, knowledge and languages.</td>
<td>Pelech &amp; Macpherson, 2009; Khandakar et al.2020</td>
</tr>
<tr>
<td>2</td>
<td>Lack collaborations across local, regional, national, geographical, and cultural boundaries.</td>
<td>Brundiers &amp; Wiek, 2011; Wiek et al. 2013 and 2014</td>
</tr>
<tr>
<td>3</td>
<td>Limited knowledge and understanding of GC</td>
<td>Wiek et al. 2014; Khandakar et al. 2020</td>
</tr>
<tr>
<td>4</td>
<td>Lack of competence by educators on sustainability</td>
<td>Teff-Seker et al., 2019; Khandakar et al. 2020; Matsekoleng &amp; Awshar, 2020</td>
</tr>
</tbody>
</table>

**Table 2. Opportunities for Global Classroom**

<table>
<thead>
<tr>
<th>SN</th>
<th>Potentials/Opportunities</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Global outlook to sustainable solutions</td>
<td>Wiek et al. 2014; Khandakar et al. 2020</td>
</tr>
<tr>
<td>2</td>
<td>Virtual educational technologies enhancement</td>
<td>Wiek et al. 2014; Lock, 2015</td>
</tr>
<tr>
<td>3</td>
<td>Established international standards and quality of students,</td>
<td>Justo, 2013; Wiek et al. 2013 and 2014</td>
</tr>
<tr>
<td>5</td>
<td>Integrate sustainability practices into university educational learning and experiences</td>
<td>Sipos, et al. 2008; Teff-Seker et al., 2019; Khandakar et al. 2020</td>
</tr>
<tr>
<td>6</td>
<td>Closes the gap between knowledge, skills and problems for global impact for sustainable solutions</td>
<td>Wiek et al. 2013 &amp; 2014; Servant-Miklos, 2018; Noordegraaf-Eelens at al. 2019</td>
</tr>
<tr>
<td>9</td>
<td>Promotes and allows compare classroom models and ensures variable collaboration</td>
<td>Wiek et al. 2014; Servant-Miklos, 2018</td>
</tr>
<tr>
<td>10</td>
<td>Promotes participatory actions and learning amongst the university students</td>
<td>Rieckmann, 2012; Matsekoleng and Awshar, 2020.</td>
</tr>
</tbody>
</table>

**METHODOLOGY**

A questionnaire survey was adopted and divided into two main sections. The AEC practitioners were presented asked questions to which they had expressed their opinions based on the five points Likert options of; Strongly Agreed, Agreed, Neutral, Disagree and Strongly Disagreed. The second section forms the semi-structured survey where the respondents commented freely on their perceptions on the challenges and the opportunities for GC adaptions for sustainable internationalization of university training in the AEC courses. The respondents profile is presented in Table 3 to show the spread on the respondents’ professions. Whilst views expressed are presented in Table 4. Practical Tools for International Development (2020) suggested that a minimum of 100 questionnaire survey is adequate and in this this study a total of 22 (82.96%) responses were returned out of the 270 online surveys sent out. These were from 6 universities in the 6 geopolitical regions of Nigeria. These universities have an average of 17 academics within the AEC Departments and 15 survey questionnaires were sent to each department.

The simple statistical metrics analysis was explored for easy understanding and clear presentation (Di Leonardo, 2017), with the aim of identifying the main challenges and the potentials associated with integrating GC as a tool for the internationalization of sustainability into the university educations of the AEC professions.
Table 3 Respondents Profile and Breakdown

<table>
<thead>
<tr>
<th>S/N</th>
<th>Regions</th>
<th>Architectural</th>
<th>Engineering</th>
<th>Construction</th>
<th>Total sent out</th>
<th>Total returned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>North Central</td>
<td>13</td>
<td>12</td>
<td>14</td>
<td>45</td>
<td>39</td>
</tr>
<tr>
<td>2</td>
<td>North East</td>
<td>10</td>
<td>8</td>
<td>13</td>
<td>45</td>
<td>31</td>
</tr>
<tr>
<td>3</td>
<td>North West</td>
<td>11</td>
<td>15</td>
<td>9</td>
<td>45</td>
<td>35</td>
</tr>
<tr>
<td>4</td>
<td>South East</td>
<td>13</td>
<td>13</td>
<td>12</td>
<td>45</td>
<td>38</td>
</tr>
<tr>
<td>5</td>
<td>South West</td>
<td>14</td>
<td>15</td>
<td>13</td>
<td>45</td>
<td>42</td>
</tr>
<tr>
<td>6</td>
<td>South-South</td>
<td>12</td>
<td>14</td>
<td>13</td>
<td>45</td>
<td>39</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>73</td>
<td>77</td>
<td>74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>270</td>
<td>224 (82.96%)</td>
</tr>
</tbody>
</table>

**FINDINGS**

Table 4 presents the proposed questions and statements to which the respondents’ responses are grouped into architecture, engineering, and construction regardless of geographical zone of the respondents. The views are captured in percentages for clarity and direct interpretation of views expressed by the respondents.
Table 4 Questions/Statements and Responses from Questionnaire Survey

<table>
<thead>
<tr>
<th>Questions/Statements</th>
<th>Strongly Agreed</th>
<th>Agreed</th>
<th>Neutral</th>
<th>Disagreed</th>
<th>Strongly Disagreed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sustainability is part of your university’s curricula and practices.</td>
<td>2.2%</td>
<td>26.8%</td>
<td>17.9%</td>
<td>36.2%</td>
<td>16.9%</td>
</tr>
<tr>
<td>2. Global Classroom is a common educational practice in your university.</td>
<td>0.01%</td>
<td>0.4%</td>
<td>9.8%</td>
<td>87.5%</td>
<td>2.2%</td>
</tr>
<tr>
<td>3. I am competence to teach sustainability</td>
<td>5.3%</td>
<td>10.6%</td>
<td>16.5%</td>
<td>48.2%</td>
<td>19.4%</td>
</tr>
<tr>
<td>4. Do you think Global Classroom should be adopted by your university as a method for training the AEC students?</td>
<td>67.8%</td>
<td>28.1%</td>
<td>3.1%</td>
<td>0.89%</td>
<td>0.1%</td>
</tr>
<tr>
<td>5. Global Classroom has the potential to integrate sustainability in the education of AEC students for future employment and sustainable practices.</td>
<td>89.7%</td>
<td>9.9%</td>
<td>0.4%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>6. The AEC professional institutes, and the Nigerian Universities Commission (NUC) are important stakeholders to ensure awareness and to explore the institutionalization of sustainability in the university education of the AEC professionals</td>
<td>10.7%</td>
<td>88.3%</td>
<td>1.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>7. Government regulatory agencies and Nigerian educational policies have adequately support the integration of sustainability education</td>
<td>15.9%</td>
<td>16.5%</td>
<td>0.0%</td>
<td>47.5%</td>
<td>20.1%</td>
</tr>
<tr>
<td>8. Do you think there would be some challenges/limitations for the integration of sustainability into the curricula of the Nigerian Universities? Please explain in the space provided.</td>
<td>31.2%</td>
<td>67.8%</td>
<td>0.90%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>9. Do you think there would be some challenges/limitations for the adaptation of GC in the Nigerian Universities? Please explain in the space provided below</td>
<td>81.6%</td>
<td>17.0%</td>
<td>0.0%</td>
<td>1.3%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

DISCUSSIONS

The theoretical discourse suggests a global awareness and interest in sustainability university education and the use of Global Classroom as tool for promoting sustainable education. However, findings from this survey revealed that there are limitations in the understanding of sustainability in itself, limitations on the application of GC and consequently in its adaptation.

In this study, the responses suggest that, 36.2% and 16.9% (53%) of the respondents are clearly not aware that, their universities are sustainable compliant and about 60% are also not confident of their ability to teach sustainability. This is an indication that the AEC students are not adequately positioned and trained to compete favourably with other AEC students across the globe in terms of job requirement and the application of sustainable applications in their future practices.
Results on the potentials for the GC is highly positive, with about 90% agreement but surprising because the respondents are not privileged to operate with GC. This is an indication that when GC is formally adopted as a tool for educating the AEC students, it will be generally acceptable by these educators. As such, it is possible for the educators to seek for the adaptation of GC and invariably to further integrate and embed sustainability into their individual course curricula. This position was strongly agreed to with 67% and a further 28% also agreed for the adaptation of GC into their university system of training.

Whilst, about 99% of the respondents also agreed that the AEC professional institutes, and the Nigerian Universities Commission (NUC) are important stakeholders to ensure awareness and to explore the institutionalization of sustainability in the university education of the AEC future professionals. This again shows that the respondents have confidence on the ability of the different professional institutes and NUC to coordinate and produce a benchmark for the operations of GC in the university system in Nigeria.

On the other hand, about 68% of the respondents do not agreed that Government regulatory agencies and Nigerian educational policies have adequately supported the integration of sustainability education. This serves as further explanations as to why the respondents do not perceived their universities to be sustainability compliant.

The follow-up question on the challenges/limitations for sustainability in questions 8 on Table 4 have the following responses recorded:

• The inadequate knowledge and proper understanding sustainability integration into the curricula of the AEC courses.

• Lack of specific guidelines and framework for the integration of sustainability into AEC university education.

• Lack of coordination by professional institutions and NUC.

• The NUC set minimum standards for university education related to the AEC course requires updating.

Responses for challenges/limitations for GC asked in questions 9 on Table 4 suggested the following:

• Limited knowledge on the term “Global Classroom” and its aim for global standardization of university education for sustainability.

• About 82% of respondents perceived Global Classroom as a means of continuous education amidst the Covid-19 pandemic. The remaining 18% are of the opinion that, GC would be limited by:

• Lack of steady electricity supply to run an online programme

• Unsteady internet service to remain connected with scheduled classes, group assignments and other interactions requiring collaborations.

• The differences in global time zones may limit GC to regional classrooms.

• Limited availability of virtual learning facilities.

• Language barriers would affect communication between students and sustainable educators.

• There is no known regulation or legislation to support GC in Nigeria.

These points enumerated above are therefore, the peculiar challenges/limitations for the Nigerian context for the adaptation of GC for the education of the AEC students.

CONCLUSION

To promote the adaptation of Global Classroom in the Nigerian system of education, its understanding, principles, processes and applications would have to enshrined into the AEC education and professional requirements and enforced by professional institutes and the National University Commission.

This study is able to identified what would constitute challenges/limitations for the integration of sustainability and GC into the education and training of the AEC students in the Nigerian context, despite the potentials enumerated in Table 2.
Consequently, the AEC educators, the AEC professional institutes, and the National University Commission NUC would be required to provide a benchmark. Additionally, the legislating arms and the Federal government should provide legislation and supporting policies for the adaptation of GC. More so, that the global pandemic of Covid-19 has further propel the use of virtual technologies for educational interventions and innovations.

Conclusively, GC has become an option being pursued elsewhere and the AEC education and training in Nigeria cannot afford to remain inactive in this regard, as potentials for engaging with GC remains a sustainable educational tool for sustainable development. Thus, promoting the solving of local socio-environmental problem sustainably with a global positive impact for replications.

REFERENCES


