

ASSESSING THE SUSTAINABILITY CONTENT IN KENYA'S INTERIOR DESIGN CURRICULA

Authors

Rose Achieng Oduho⁽¹⁾ ; Vikiru George⁽²⁾ ; Mireri Caleb⁽³⁾ 

Main author's email: rosenakhumbi@gmail.com

(1.2.3) Kenyatta University, Kenya.

Cite this article in APA

Oduho, R. A., Vikiru, G., & Mireri, C. (2022). Assessing the sustainability content in Kenya's interior design curricula. *Journal of pedagogy and curriculum*, 1(1), 1-13. <https://doi.org/10.51317/jpc.v1i1.237>



A publication of Editon Consortium Publishing (online)

Article history

Received: 24.06.2022

Accepted: 26.07.2022

Published: 31.08.2022

Scan this QR to read the paper online



Copyright: ©2022 by the author(s). This article is an Open Access article distributed under the terms and conditions of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License (CC BY-NC-SA 4.0).



Abstract

This study aims at providing local pertinent facts on the level of sustainability content integration and pedagogical methods used to deliver Interior Design courses in Kenya's training. A systematic audit of undergraduate curricula was undertaken to understand the extent to which sustainability content was included in Kenya's Design education. Document analysis was employed to gather information from four of Kenya's University curricula for Interior Design. Heads of Design curricula from sampled Universities were also interviewed to corroborate the facts gathered from the respective universities. The data collected were analysed using descriptive methods of statistics. Findings suggest that sustainability content included in the curriculum is minimal (6.3%), yet students are more likely to adopt practises that promote a healthy indoor environment when integrated. Consequently, this significantly reduces problems linked to Sick Building Syndrome. In this regard, sustainability content should be increased in Kenya's interior design curriculum to ensure future designers are equipped with the knowledge and skills to promote sustainable interiors that focus on Indoor Air Quality, water efficiency, green materials and technology.

Key terms: Integration, sustainability, indoor environments, indoor air quality, water efficiency.

1.0 INTRODUCTION

The world population is anticipated to reach 9.7 billion by 2050, with about 90 per cent of the people living in cities. With such rapid population growth and urbanisation, annual waste creation is expected to increase by 70 per cent above present levels, reaching 3.40 billion tons in 2050, thus worsening pollution levels (Wowrzeczka, 2021; UNDP, 2021). In addition, a growing population places a demand for the construction of new buildings. According to an International Energy Agency assessment, in 2018, the building sector consumed half of the world's energy (Gaulmyn & Dupre, 2019). Reducing the ecological footprint is cited as one of the critical solutions in achieving healthy environments and disseminating knowledge on sustainability to professionals for implementation. However, the latter is considered more effective in encouraging the adoption of sustainability in interior design, thus, increasing the number of healthier environments (Simsar, 2021). It is, therefore, critical to acknowledge that education is vital in increasing the adoption of sustainability in interior design. However, integration of sustainability in education is minimal worldwide, and therefore increased integration is required at various professional and educational levels (Nagendra et al., 2018). In the building sector, educating interior designers to implement sustainability within interiors remains a significant avenue for reducing the ecological footprint and increasing the number of quality indoor environments available. Acquiring knowledge of sustainable building practises is therefore considered integral to interior designers' university education.

Universities must equip their students with knowledge that enables them to understand environmental concerns and become inspired to conserve it (Osmond et al., 2014). In higher intuitions of learning, equipping students with environmental education provides them with the knowledge, skills and motivation needed to confront challenging environmental issues in the twenty-first century. The institutions are therefore mandated to inculcate environmental values essential in each discipline to achieve a sustainable society. In addition, to implementing those sustainability strategies within their campuses. Although universities offer required stand-alone courses specifically configured to train on sustainability, integrating sustainability and ecological interests into the broader coursework lacks yet, it is more effective and essential if included (Ilya & Shrikant, 2021; Sammalisto & Lindhqvist, 2008).

Henceforth it is implicit and imperative for institutions of higher education to ensure students understand the environmental consequences linked to their professional activities. Fabrizio and Idil (2019) assert that design should adopt a philosophical approach rather than design in teaching sustainability. Since the philosophical approach of design for sustainability will ensure that designers practice it as inspired by its philosophical concepts. Including sustainability content in interior designers' curriculum marks a critical paradigm shift needed to guide contemporary design training (Danya, 2016). Further, Olweny (2018) opines that it is paramount that those design programs that seek validation and recognition demonstrate the inclusion of sustainability content. In addition, Ibrahim (2019) points out that integrating sustainability in professional training is compelling as scientists foresee a rise in low-quality indoor environments due to environmental degradation.

The Interior design sector continues to heighten environmental degradation by mining raw materials for the construction and operation of buildings. It is estimated that buildings contribute 50 per cent of raw material, 13 per cent of water, 40 per cent of energy consumption, 40 per cent of landfills, and 50 per cent of greenhouse gas emissions worldwide (Yan et al., 2016; Sizerici et al., 2022). Deterioration in

environmental conditions has been linked to existing low-quality indoor environments, referred to as suffering Sick Building Syndrome. This has increasingly exposed consumers to imminent health risks and poor job productivity worldwide (Qayyum et al., 2020). In Kenya, Sick Building Syndrome is associated with a respiratory disease burden of 39 per cent (EPA, 2021, Nici et al., 2017). Since the long-term health effects of low-quality indoor environments show up years after exposure, educating designers on sustainability integration ensures a reduction in the number of sick buildings (Kwaku et al., 2014). Radhika and Janda (2019) point out that an increase in sick buildings is directly associated with little practice of sustainability principles. This is because designers are either limited or lack knowledge of sustainability, as found by Hereen et al. (2016). Ispen concludes that educating designers on sustainability is the most effective method of increasing its uptake. Training equips designers with knowledge skills, technical expertise and confidence to design and implement sustainability in buildings. Education for sustainability develops attitudes, values, and worldviews necessary to enable designers to employ strategies that contribute to sustainable patterns among individuals and communities.

Currently, interior design education is centred on interior design studios, with courses in architecture theory and history, aesthetics, graphic presentation techniques, building construction, structure, and material technologies supplementing the curriculum. (Olweny, 2018). The existing gap could be synchronised by educating interior designers on sustainability concepts. Conversely, it highlights a substantial gap in the curricula of interior design courses in Kenya and Africa (Akinshipe & Aigbavboa, 2018). There is a dire need to integrate sustainability into interior design education in Kenya. The move concurs with the signing of the Machakos Declaration of 2016 for Sustainability in Architectural Education. The declaration aimed to promote energy efficiency in the designs of East African buildings (Otieno, 2018; EEBA, 2018). Training on the green concept is essential now that Kenya is striving to satisfy an increased demand for buildings while at the same time protecting its environment and the physical and social well-being of its citizens. The call is also embedded in its National Climate Change Action Plan 2018-2022, Article 4.1.2-C.10 (GoK, 2018). It was, therefore, important to investigate how Kenya's Interior Design education responded to the challenge.

2.0 LITERATURE REVIEW

Iwasaki (2022) opines that educating children on the environment early in childhood can raise their sustainability awareness and influence attitudes and future behaviours. The study in a survey that attempted to measure the impact of an Eco-Education Program for Early Childhood education on water saving behaviour of children of Fukuoka, Japan, revealed the finding. Thus, the move ensures future sustainable lifestyles in that it creates a generation that is more aware of sustainability than its predecessors. On the contrary, in higher education, Templeton's (2011) survey found that sustainability is not studied or comprehensively covered in institutions because it is considered a specialised field. Ramirez (2012) surveyed 221 undergraduate curricula, websites, and tutors of Industrial design in different countries in the USA, UK, Australia, and South Africa. The author posits that sustainability content should be integrated early into designers' training and be carried all through to the postgraduate level. In Sweden, Sammalisto and Lindhqvist (2008), in a survey, examined higher education institutions offering architecture, interior design and engineering to check for sustainability inclusion in training. Findings indicated that there were low levels of sustainability included in the training programs. In Malaysia, Kuper (2009) surveyed 100 architectural students at Temple University and established that awareness and

knowledge of sustainable roofs were lacking in half of its respondents. He found that the respondents had neither heard of nor seen such roofs.

Moreover, Rasha (2017), in a survey, investigated existing levels of sustainability content in interior design curricula in Egypt universities. The study discovered that they were all lacking in sustainability. The instructors did so in institutions where sustainability was taught out of the personal initiative. In addition, instructors that were knowledgeable on sustainability issues attained it through personal research, i.e., self-taught via the internet (55%), scientific papers (34%), conferences (8%) and by supervising postgraduate thesis on sustainable design. Most (67%) of the instructors proposed that teaching sustainability be spread throughout the curriculum and not as a 'stand-alone' course. This is because students usually view stand-alone as optional and not a requirement. In South Africa, Akinshipe and Aigbavboa (2018) investigated the extent to which the construction education curriculum integrated sustainability content. Findings show that its integration was shallow and vague. The curricula failed to cover fundamental elements of sustainability and did not even provide a method of achieving it in practice. It is important to note that he reviewed studies on sustainability in developed nations. Their situational facts may not necessarily be true enough to inform developing nations' decision-making effectively. This is because the dynamics (environmental, social and economic) influencing sustainability inclusion in developed nations' education differs from those in developing nations.

In Uganda, Olweny (2018) examined Uganda's architectural training and found insignificant integration of sustainability content in undergraduate architectural curricula. The study concluded the same from an evaluation conducted on architectural programs across East African universities. The study confirmed architectural programs lacking sustainability content linked to climate change, even though support/lecture-based courses existed on climate, comfort, and building/material performance. Furthermore, the pedagogy used in teaching these courses in studio/practical for green architectural solutions was unclear. The studies were either support or lecture-based, with no link to studio practice. Olweny further exhibits that course instructors were not conversant with the philosophy of sustainability in the design of buildings and so rarely taught it.

In Kenya, Mukhwana (2016) eludes that 95 per cent of design instructors in two Kenyan universities admitted to having taught sustainability in their lessons. However, findings by Olweny (2018) dispute the possibility of design/architecture students in Kenya having been taught sustainability. This revelation was further confirmed by Akeel et al. (2019) indicating that, in Africa, only engineers had integrated sustainability in content (Nigeria Africa) their curricula, not in other design disciplines. Note that the findings expose some inconsistencies that could be a result of the methodology used or reporting. Addressing such inconsistencies is especially important since Hereen et al. (2016) observed that interior designers do not necessarily confess what they do, as portrayed by Mukhwana's (2016) findings. Therefore, Leddy continues to advise that scrutinising design curricula for sustainability content would be a more credible method. This is opposed to questioning tutors, a suggestion made by Mukhwana (2016).

Equally important, Ambole (2011) confirms that sustainability was not taught in Kenya's undergraduate studies. Her analysis showed that 51 per cent of third and fourth-year respondents from the school of design cited: little knowledge, lack of confidence and ill equipment as significant drawbacks to their inclusion of sustainability in studio projects. The flaws were associated with the fact that course instructors

are unprepared to teach sustainability and, therefore, rarely teach it. Were (2015) found that most of the building professionals in Kenya conversant with sustainability were locally trained. This point out the need for integrating sustainability into Kenya's interior design education.

Limited studies outside the developed economies on sustainability in interior design education exist. Those existing have inconsistent findings or lack documentation on local situations that can inform decision-making. This has made governments and other stakeholders hesitant to promote and formulate policies on sustainability in education and building. Owing to the gaps identified, this paper aimed to document facts on the extent of sustainability integration in Kenya's Interior Design education. The findings are significant in informing local decisions to overcome sustainability uptake challenges improve indoor environment quality and enhance human health as outlined in Sustainable Development Goals 6, 7 and 8.

3.0 RESULTS AND FINDINGS

Categories of Courses in Kenya's Design Curricula

Before determining the extent of sustainability content integrated into interior design education, the course units were categorised into three. This was informed by Kenya's Commission for University Education Standards 2014, accreditation criteria for guiding content in academic programs. It categorises courses into university standard units (UCU), core units and elective units. The categories revealed the nature and composition of courses in interior design curricula. The results were presented in figure 1.

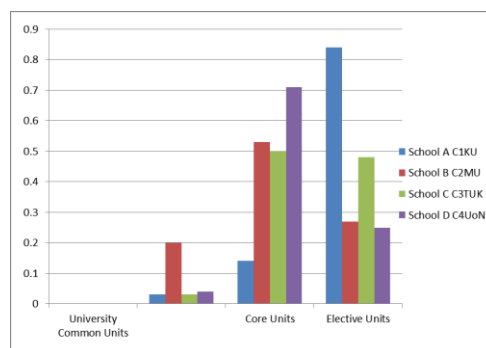


Figure 1: Categories of Course Units in Design Curricula

The results showed that, on average, the bulk of courses in design curricula were apportioned almost equally between electives (46%) and core (47%). In comparison, university standard units (UCU) were given the most minor (08%) portion. Further results indicated that School A (C1_{KU}) offers the greatest (119) number of courses, with a more significant (84%) portion given to electives. However, the symmetry perceived in course allocation was not balanced since 84 per cent was allocated to electives, 14 per cent to the core and 3 per cent to university standard units. School B (C2_{MU}) almost achieved a perfect balance by giving 53 per cent to core units, 27 per cent to electives and 20 per cent to university standard units. School C (C3_{TUK}) allocated 50 per cent to the core, 48 per cent to elective and 3 per cent to university standard units. The results are almost like school D's (C4_{UoN}) 71 per cent allocation to the core, 25 per cent to elective and 4 per cent to standard university unit.

The results implied that the UCU category formed the least (8%) courses, yet none integrated any content on sustainability. There existed an imbalance in C1_{KU} whereby the bulk (84%) of its courses were electives.

This implies that the probability of encountering sustainability content during interior design training was diminished since the chances of students not electing the courses were higher. The situation was different for C2_{MU}, which had 53 per cent, C3_{TUK} 50 per cent, and C4_{UoN} 71 per cent allocation to core units. This implies that the chances of interior designers encountering sustainability content during training were heightened as this category was compulsory.

Levels of Sustainability Courses/Content in Design Curricula

It was essential to determine levels of sustainability content integration in Kenya's design curricula. This necessitated that course classification is done for each curriculum. The exercise was to reveal courses that addressed environmental issues and provided a means to gauge the extent of sustainability content integration and, thus, its teaching in Kenya's interior design. Kenya's Commission informed the course mapping exercise for University Education Standards-2014. During this phase, course titles and subsequent subtopics were examined to provide descriptive uses to denote levels in terms of frequencies and percentages in each curriculum. The results were as presented in table 1.

Table 1: Course Mapping in Design Curricula

Types of Course Genres	School A C1_{KU}	School B C2_{MU}	School C C3_{TUK}	School D C4_{UoN}	Average
Foundational courses: a) Art/Design History b) Art/Design concepts	23 %	28%	23%	41%	28.8%
Concept Application/Implementation & skill development	66%	22%	45%	29%	40.5%
Environmental (Green)	2%	8%	7%	8%	6.3%
Technology based	11%	24%	11%	13%	14.8%
Project-based	23%	22%	10%	29%	62%

The C1_{KU} recorded insignificant (2%) integration of sustainability content and yet emphasised (66%) the concept and skill development aspect by allocating many courses to that aspect. In general, the results show that, on average, sustainability content was integrated at 6.3 per cent in the curricula. The C2_{MU} and C4_{UoN} had almost achieved a balance in terms of the ratio allocated to each genre. However, they still had low integration of courses related to sustainability.

The finding indicates that few courses with minimal content were dedicated to sustainability, yet Kenya's Commission for University Education had made provision for it in the course genre - Environment. The minimal integration of sustainability content was not only an observation of Kenya's Interior design

curricula, but a confirmation of Akinshipe and Aigbavboa (2018), Rasha (2017), Olweny (2018), Ambole (2011), and Association of African Universities (2012) studies based in African countries. The results could indicate that sustainability is a new concept in Africa and needs time for sensitisation to mature and be practised regularly. The findings signify the need for a deliberate effort to integrate sustainability content in Interior design education and practice.

Configuration of Courses with Sustainability Content

To capture the details, levels and intricacies revealing the composition and nature of design courses through which sustainability content is delivered, it was essential to analyse the configurations of the design courses. The analysis was based on content to identify themes related to the environment, thus denoting sustainability. A document analysis chart enabled the recording of detailed results in the form of frequencies shown in table 2:

Table 2: Configuration of Courses with Sustainability Content

Configuration	School A C1 _{KU}	School B C2 _{MU}	School C C3 _{TUK}	School D C4 _{UoN}	Total
1. As Topics	3(18.8%)	4 (25%)	4 (25%)	5 (31.3%)	16
2. An entire course	0 (None)	4 (40%)	2 (20%)	4 (40%)	10

The results show that out of the four curricula investigated, only three: C1_{KU}, C2_{MU}, and C4_{UoN}, had sustainability content integrated. Unfortunately, sustainability was only taught during the final year of study. The observation implies that minimal time and priority were awarded to training on sustainability; correspondingly, students lack adequate time to practice the concept in class. Another observation was that all courses (26) that integrated sustainability content did so by: either including related topics or dedicating entire courses to it. For instance, out of the total number of courses, 16 of them had the concept integrated as topics, while 10 had entire courses dedicated to it. The observation is commensurate with Rasha's (2017) studies, which concluded that dedicating entire courses (stand-alone) to green is advantageous. This is because it allows students to have in-depth interactions with the subject matter, for it affords ample time.

On the other hand, Rasha adds that it should be used minimally since stand-alone courses on sustainability may not be given the emphasis they need by students. The students may even view the concept as optional. Olweny's (2018) findings concur with the same observation and advise on the need for a method to link information from stand-alone courses with studio/practical since it is usually a challenge.

Comparably, another finding shows that the bulk of topics on sustainability was concentrated in the last years of the training (three and four) instead of being spread throughout the training period. A deliberate design of topic spread should be done to achieve topic intensity gradually. Many sustainability topics

should fall between the 2nd and 3rd years of study, i.e., the topic spread should mimic those of natural cycles, whose peaks are achieved gradually, and a decline of the same follows (Megonigal, 2008). Thus, the intensity of sustainability courses should not be the same from the beginning of a course/programme to its end. As informed by the norm in natural cycles, the bulk (peak) of sustainability courses/topics should be at the end of the second and whole of the third year, then a gradual decline of the same in the fourth year. This finding calls for reviewing various design curricula to re-design the distribution of sustainability courses/topics.

Topics Linked to Sustainability Variables

This study further found a need for an in-depth examination of the course topics to identify those linked to sustainability variables and their respective levels of integration. This revealed the priority level accorded to training on the three variables in the design curricula. The sustainability variables examined were: Indoor Air Quality (IAQ) elements, provision for water efficiency, materials and technology and environmental pollution (informed by LEED certification points). The results were as presented in table 3:

Table 3: Topics of Sustainability Variables

Topics per variables	Percentage
1. IAQ elements	52%
2. Water efficiency	4%
3. Materials & Technology	40%
4. Environmental Pollution.	4%

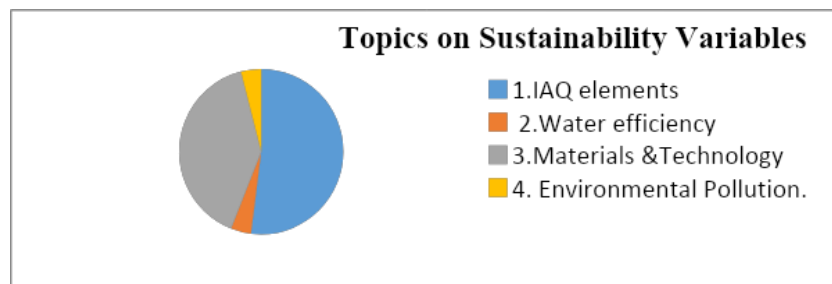


Figure 2: Topics on Sustainability Variables

The findings show that priority was mainly (52%) accorded to topics addressing sustainability on Interior Air Quality elements (IAQ) especially lighting. This was followed by topics linked to green materials and technology, equivalent to 40 per cent, while those on water efficiency and pollution provision were 4 per cent. The only curriculum that integrated water efficiency issues was C2_{MU}. This implied that minimal attention is paid to educating interior designers on water efficiency and reducing pollution. A possible conclusion for such a result is that, perhaps, many of the course instructors were not conversant with sustainability concepts, as confirmed by heads of design curricula and Olweny (2018). Heads of curricula stated that during curricula reviews, sustainability did not feature in discussions since most faculties were

unaware of it. Therefore, it is not included mainly among topics in design curricula. This study's findings resonate with those of Khaemba and Mutsune (2013), where the level of sustainability in buildings was lowest in providing water efficiency and highest in IAQ elements, especially lighting. However, Fawaz's (2013) findings were contrary to this, although both types of research were based in Kenya. This is perhaps because of the different methodologies adopted in carrying out the research.

This study also found that many courses linked to sustainability variables were integrated into the third and fourth years of interior design training. However, it meant that the time for students to interact practically and integrate sustainability concepts in designing projects was limited. This denies them ample time that is usually necessary for developing confidence to use a concept in providing a solution, a training challenge previously identified by (EEBA, 2018). Table 4 below indicates sustainability-related courses (as codes) and the year/levels to which they are taught.

Table 4: Sustainability-related Courses

Training level	School A C1_{KU}	School B C2_{MU}	School C C3_{TUK}	School D C4_{UoN}	Total
Year 1	0	0	2(ACDI:1104,1204),	1(BDS:105)	1(14%)
Year 2	0	4(ADI:203,206,208,210)	0	1(BDS:200)	1(23%)
Year 3	2 (AAD: 356, 382)	3(ADI:301,303,309)	3(ACDI:3101,3207,3241)	1(BDS:324)	2(41%)
Year 4	1(AAD: 441)	1(ADI:401)	0	3(BDS:401,403,405)	1(23%)

Pedagogical Modes Used in Course Delivery

Lastly, this paper revealed several pedagogical methods used to deliver sustainability content during design training. The identified pedagogical methods had strengths that enhanced students' understanding of the content and weaknesses that curtailed the delivery of subject content, affecting students' understanding and practice of sustainability. The study findings also revealed the rate at which each pedagogical method was used in teaching sustainability content. The results were as presented in table 5 below:

Table 5: Pedagogical Modes used in Course Delivery

Mode of Course delivery	Application rate
Studio Practical	56%
Lecture	40%
Combination (Lecture + Studio.)	4%

The main pedagogical methods used in the delivery of sustainability-related courses/content and their rate of use were studio practical (56%), lecture method (40%), and combination (4%) of lecture and studio practicals. The findings imply that studio practicality was the dominant method of delivery. It was also noted that it lacked an explicit pedagogy that connected and translated knowledge gained from theory lessons into studio practicals. The findings coincided with those of Olweny (2018) and Assali (2017), which concluded that a good pedagogy involves a combination of methods, ensuring quality delivery. A combined teaching method creates an ideal and superior knowledge transfer and acquisition platform. The authors argue that combining theory on sustainability concepts with its technical aspects in the studio enables students to understand the subject better. When teaching methods are used separately, students find it challenging to recall information from previous theory classes to input in studio classes later.

Furthermore, Ramirez (2012) advocates for students to be allowed significant control over sustainability programs in design. This means that students should be permitted to participate in deciding what goes into their programs. This will enable them to own the issues around sustainability and understand and adopt the concept in their future designs.

4.0 CONCLUSION AND RECOMMENDATION

Conclusion: This study aimed to provide information on the level of sustainability content integrated into Kenya's Interior Design curricula for undergraduate education. Based on a descriptive analysis of the interior design curriculum, it can be concluded that there was an insignificant (6.3%) level of sustainability content integrated. The results indicated that increasing sustainability content in interior design training was necessary. This is especially important if Kenyan-trained interior designers confidently adopt sustainability in providing solutions to interior problems. This contributes to reducing Sick Building Syndrome and enhancing human health and productivity in healthy spaces.

Recommendation: This study recommends that future designers should be equipped with knowledge and skills to promote sustainable interiors that focus on Indoor Air Quality, water efficiency, green materials and technology, sustainability content should be increased in Kenya's interior design curriculum.

5.0 REFERENCES

1. Akeel, U., Bell, S. J., & Mitchell J. E. (2019). Assessing the sustainability content of the Nigerian engineering curriculum. *International Journal of Sustainability in Higher Education*, 20(10). DOI: 10.1108/IJSHE-11-2018-0217.

2. Akinshipe, O., & Aigbavboa, C. (2018). Preparedness of Built Environment Students on Sustainability and Green Building Issues: How are South African Higher Education Institutions Faring? DOI:<http://hdl.handle.net/10210/290167>.
3. Assali, I. M. (2017). The Contribution of Interior Design Studio in Promoting Sustainable Design in Bahrain. *International Journal of Mechanical Engineering and Technology* (IJMET); 8(10)25–34. https://iaeme.com/MasterAdmin/Journal_uploads/IJMET/VOLUME_8_ISSUE_10/IJMET_08_10_004.pdf.
4. Danya, H. (2016). *Examining the Status and Future of Design for Sustainable Behaviour in Interior Design Education*. (Doctoral Dissertation, Virginia Polytechnic Institute and State University) campus repository.
5. EEBA. (2018). *Terminal Evaluation of the United Nations Environment Project Promoting Energy Efficiency in Buildings in East Africa*. URI: <http://hdl.handle.net/20.500.11822/29744>.
6. EPA. (2021). Introduction to Indoor Air Quality. *United States Environmental Protection Agency*. <https://www.epa.gov/indoor-air-quality-iaq/introduction-indoor-air-quality>.
7. Fabrizio, C., & Idil, G. (2019) *Design for Sustainability*. DOI:10.4324/9780429456510.
8. Fawaz, B. (2013). *Maintenance Management of Green Buildings in Nairobi County*. Masters Thesis, University of Nairobi; Kenya, University repository. <http://erepository.uonbi.ac.ke/handle/11295/55684>.
9. Gaulmyn, C., & Dupre, K. (2019). Teaching Sustainable Design in Architecture Education: Critical review of Easy Approach for Sustainable and Environmental Design (EASED). *Journal of Science Direct* 8(2), 238-260, DOI: <https://doi.org/10.1016/j.foar.2019.03.001>.
10. GoK. (2018). Government of Kenya. National Climate Change Action Plan (Kenya) 2018-2022. Ministry of Environment and Forestry, Nairobi, Kenya. <http://www.environment.go.ke/wp-content/uploads/2020/03/NCCAP-2018-2022-v2.pdf>. <https://ideas.repec.org/a/ibf/gjbres/v8y2014i3p69-76.html>.
11. Hereen A., Singh A. S., Zwickle A., Kootnz T. (2016). *International Journal of Sustainability in Higher Education* 17(5). DOI: 10.1108/IJSHE-02-2015-0014.
12. Ibrahim, B. M. (2019). The Concept of Sustainability and Innovation in Banking. Conference: ICBSI 2018 - *International Conference on Business Sustainability and Innovation*. DOI: 10.15405/epsbs.2019.08.18.
13. Ilya, B., & Shrikant, K. P. (2021). Commitment of Higher Education Institutions to Sustainability Agenda: Evidence from GCC Countries. *Journal of Contemporary Issues in Business and Government*, 27(2), DOI: 10.47750/cibg.2021.27.02.438.
14. Iwasaki, S. (2022). Effects of Environmental Education on Young Children's Water-Saving Behaviors in Japan. *Journal of Sustainability*, 14(6), 3382. <https://doi.org/10.3390/su14063382>.
15. Khaemba, P., & Mutsune, T. (2014). An Exploration of Potentials to Green Building Adoption in Kenya and Industrial Implications. In *Global Conference on Business & Finance Proceedings, Institute for Business & Finance Research*, 9 (1), 480.
16. Kuper, R. 2009. What's Up? Examining the Awareness of Green Roofs in Suburbia. *Journal of Soil Water Conservation*, 64 (5), 145A-149A.DOI: <https://doi.org/10.2489/jswc.64.5.145A>.
17. Kwaku, A., Lamia, H., & Paul, V. (2014). *The Construction Industry in Ghana, West Africa*. Masters thesis; Blekinge Institute of Technology, Karlskrona, Sweden. <https://www.diva-portal.org/smash/get/diva2:829734/FULLTEXT01.pdf>.

18. Megonigal, J. P. (2008). *Earth System: History and Natural Variability*. 4. Global Natural Cycles. <http://www.eolss.net/sample-chapters/c12/e1-01-08.pdf>.
19. Mukhwana, H. W. (2016). *Incorporating Sustainability into Interior Design Curriculum*. In partial fulfilment of the requirements of Master of Arts Degree in Design. School of the Arts and Design University of Nairobi, Kenya.
20. Nagendra, H., Bai, X., Brondizio, E. S., & Lwasa, S. (2018). The Urban South and the Predicament of Global Sustainability. *Nature Sustainability*, 1(7), 341-349 <https://doi.org/10.1038/s41893-018-0101-5>.
21. Nici, Z., Kaveh, D., James, M., Mwangi, C., Balázs, C., Kanyiva, M., Blessing, M., Catherine, K., Henry, F., Wilkinsonb, P., Daviesa, M., & Marcella, U. (2017). *Indoor Air Pollution as an Issue of Non-Attention in Nairobi's Informal Settlements*. Proceedings of the 35th International Conference of the System Dynamics Society, Cambridge. <https://proceedings.systemdynamics.org/2017/proceed/papers/P1298.pdf>.
22. Olweny, M. (2018). Introducing Sustainability into an Architectural Curriculum in East Africa. *International Journal of Sustainability in Higher Education* 19(6) DOI:10.1108/IJSHE-02-2018-0039.
23. Osmond, P., Malay, D., Prasad, D., & Li, F. (2014). *Transforming Universities into Green and Sustainable Campuses: A Toolkit for Implementers*. UNEP Environmental Education and Training in collaboration with the Cooperative Research Centre for Low Carbon Living. https://wedocs.unep.org/bitstream/handle/20.500.11822/11273/Greening_unis_toolkit_Single_Page.pdf?sequence=1&isAllowed=1.
24. Otieno, N. (2018). *The Green mark Standard for Green Buildings: Green-mark A Tool for Rating and Certifying Green Buildings*. Kenya Green Building Society. <https://www.undp.org/sites/g/files/zskgke326/files/migration/ke/Final-Draft-GreenMark-Standard-for-Green-Buildings---20180918.pdf>.
25. Qayyum, S., Tariq, S., & Younas, F. (2020). Sick building syndrome and job performance in women factory workers. *Journal of Postgraduate Medical Institute*, 34(1).
26. Radhika, K., & Janda, B. K. (2019). India's building stock: towards energy and climate change solutions. *Building, Research & Information*, 47(1), 1-7, DOI: 10.1080/09613218.2019.1522482.
27. Ramirez, M. (2012). *Educating the Responsible Industrial Designer*. Proceedings of ICERI2012 Conference 19th-21st November 2012, Madrid, Spain.
28. Rasha, M. A. E. (2017). Towards Sustainability in Interior Designers Education in Egypt. *Procedia-Social and Behavioral Sciences*. *Asian Journal of Environment-Behaviour Studies*, 2(5), 109-119.
29. Sammalisto, K., & Lindhqvist, T. (2008). Integration of Sustainability in Higher Education: A Study with International Perspectives. *Journal of Innovative Higher Education*, 32 (4), 221-233. DOI:10.1007/s10755-007-9052-x.
30. Simsar, A. (2021). Young Children's Ecological Footprint Awareness and Environmental Attitudes in Turkey. *Springer Nature*, 14(4), 1-27 <https://doi.org/10.1007/s12187-021-09810-7>.
31. Sizerici, B., Fseha, Y., Cho, C., Yildiz, I., & Byon, Y. (2021). A Review of Carbon Footprint Reduction in Construction Industry, from Design to Operation. *National Library of Medicine*. <https://doi.org/10.3390/ma14206094>.
32. Templeton, A. (2011). *Perceptions of Practicing Interior Designers: Motivations that Encourage their Sustainable Design Practices*. A thesis in partial fulfilment of the requirements for the Degree of Master of Science in the Department of Design and Merchandising, Colorado State University Fort Collins.

33. UNDP. (2021). United Nations Department of Economic and Social Affairs, Population Division. *Global Population Growth and Sustainable Development*. UN DESA/POP/2021/TR/NO. 2.
34. Were, S. W. (2015). *Investigation into Adopting Green Building Concepts in Commercial Buildings: A case of Nairobi County*. Masters Thesis, Jomo Kenyatta University of Agriculture and Technology Kenya.
35. Wozniczka, B. (2021). City of Waste Importance of Scale. *Journal of Sustainability* 13(7) 3909. <https://doi.org/10.3390/su13073909>.
36. Yan, N., Yadi L., Shuangshuang, Y., & Chuanjing, J. (2016). Exploring Socio-Technical Features of Green Interior Design of Residential Buildings: Indicators, Interdependence and Embeddedness. *Journal of Sustainability*, 9(33)1-15. <https://doi.org/10.3390/su9010033>.