

## **Transforming Global Architectural Training Curriculum: Integrating Disaster Mitigation and Sustainable Reconstruction**

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The field of architecture plays a pivotal role in shaping the physical environment and tackling the challenges posed by natural disasters and unsustainable practices. However, conventional architectural training programs often lack comprehensive education on disaster mitigation and sustainable reconstruction. This research paper aims to delve into the pressing need to integrate disaster mitigation and sustainable reconstruction into Nigeria's architectural training curriculum. By scrutinizing the existing gaps in architectural education, exploring the advantages of merging these disciplines, and proposing pivotal strategies for curriculum transformation, this study seeks to contribute to the advancement of architectural education. The findings of this research project will provide guidance to educators, professionals, and policymakers in their endeavours to develop a more holistic and responsive architectural training curriculum.

**Keywords:** architectural education, curriculum transformation, disaster mitigation, sustainable reconstruction.

**Word count:** 122

### **INTRODUCTION**

The world is becoming increasingly vulnerable to natural disasters, and the need for architects who can design buildings that are resilient to these events is growing. However, many architectural training programs do not adequately prepare students for the challenges of disaster mitigation and sustainable reconstruction. This paper argues that architectural training programs need to be transformed to better integrate these important topics.

A recent report by the United Nations Office for Disaster Risk Reduction (UNDRR) found that the number of people affected by natural disasters has increased by fivefold in the past 50 years. The report also found that the economic losses from natural disasters have increased by a hundred-fold in the same period. These trends are likely to continue in the future, as climate change makes natural disasters more frequent and severe.

In 2015, the United Nations developed the Sustainable Development Goals (SDGs) as a call to action for all member countries to protect the environment and ensure that all people enjoy peace and prosperity. One of the SDGs is climate action, where countries pledged to take urgent action to fight climate change. Any efforts to mitigate climate change go hand in hand with the integration of disaster risk management.

Disaster mitigation is the practice of reducing the risk of damage from natural disasters. Sustainable reconstruction is the practice of rebuilding after a disaster in a way that is environmentally friendly and resilient to future disasters. Both disaster mitigation and sustainable reconstruction are important aspects of architectural practice. The research problem addressed in this paper is the need to transform architectural training programs to better integrate disaster mitigation and sustainable reconstruction. The paper argues that this transformation is essential to ensure that the next generation of architects is prepared to design buildings that are resilient to natural disasters and that contribute to sustainable development. The research question for this paper is: How can architectural training programs be transformed to better integrate disaster mitigation and sustainable reconstruction? The research in this paper is significant because it has the potential to improve the resilience of buildings to natural disasters and to promote sustainable development. The findings of this research could be used to reform architectural training programs in developing countries where such knowledge exist.

## **Literature Review**

In recent years, the world has experienced a number of devastating disasters, including earthquakes, hurricanes, floods, and wildfires. These disasters have caused widespread damage and loss of life, and have highlighted the need for more sustainable and resilient built environments. However, it seems little awareness in architecture input is available especially in the developing world like most African countries like Nigeria. According to Acar and Yalcinkaya, (2016), even in 2016 the body of literature on integrating disaster management perspectives into architecture training curriculum remained relatively scarce. This negligence of design response to national and global issues in the curriculum of architectural design education was amplified by Owen and Dumashie, (2007) and Wang, (2010), confirming this assertion and went to propose some content and skill objectives towards improvements into design education and curriculum. Atul, (2020), described disaster management as the process of planning, managing, coordinating, and carrying out the necessary measures to prevent or mitigate a disaster and its effects. This he said include: Teaching preparedness on how to deal with a disaster,

Prompt action in the face of a disaster, Critically assessing the situation, its severity and magnitude, Evacuation, rescue, relief, rehabilitation, and reconstruction, Understanding the causes to be better prepared for the next disaster and Creating policies and plans to address other such disasters to minimize losses in the future.

Attahiru and Nabilah, (2020), examined the evolution and development of disaster management programmes in Nigeria and the achievements and success stories of the activities of the National Emergency Management Agency (NEMA), since inception. They identified among other things, that neither the Agency nor the National Action Plan for Disaster Risk Reduction has adequately recognized the imperatives of disaster management education in schools curriculum in building the resilience of nations and communities to disasters, as envisaged. According to Onigbinde, (2018), of the Centre for Epidemiology of Disaster (CRED) reported that the U.S. experienced approximately \$1.5 trillion in economic losses from 2003 to 2013, and \$92 billion in economic losses from 2015 to 2016. The records suggested that the losses have increased gradually every year. These statistics provide an overview of the monetary damages that are caused by natural disasters. Disasters, irrespective of whether they are natural, man-made, or technological, are increasing worldwide and are causing economic and collateral damages Rouhanizadeh, Kermanshachi, & Dhamangaonkar, (2019); Nahayo, et al., (2018). Different geographical locations are susceptible to different types of disasters, and the studies often focus on the type(s) of disasters that occur in that locale. For example, in Africa, particularly Nigeria, flood, fire, erosion and to some extent activities of banditry causing massive displacement of large number of population are major disasters.

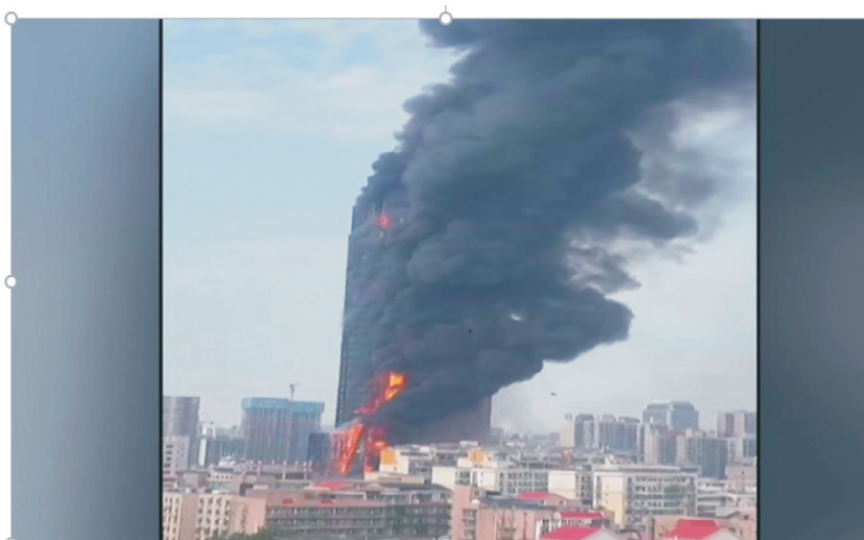


Figure 1, fire disaster in a city. Source: author.

Shah et al. (2018) in Pakistan, focused on floods while discussing students' preparedness, as Pakistan is more prone to flooding than to other types of disaster.



Figure 2, Flood ravaged area of a city. Source: author.

Developed world are faced with other forms of disasters, like snow, earthquake, tsunamis, landslide and mudslide, etc.

Architects play critical roles in designing for disaster resilience. Griffiths, (2004) stressed the need for integration of knowledge production and research and teaching to built environment disciplines. They can design buildings that are more resistant to natural disasters, and that can be more easily repaired or rebuilt after a disaster. They can design buildings that are more energy-efficient and sustainable. Architects can also work with communities to develop disaster preparedness plans. These plans can help communities to reduce their risk of being affected by a disaster and to recover more quickly if a disaster does occur. Charlesworth and Fien, (2022) were of the opinion that developing design solutions at housing and settlements scales like preparing house designs and community master plans, is the core competency of architecture. They noted however, this expertise has been neglected and the number of built-environment professionals such as architects equipped to respond in such situations is still very low. According to Spiekermann et al. (2015), there are two major barriers to effectively handling a disaster: lack of required resources to apply knowledge, and lack of knowledge for making evidence-based decisions when needed. The lack of appropriate teaching materials is another major barrier to students' preparedness Nahayo, et al., (2018).

The critical role played in the design and construction of buildings and infrastructure by architects cannot be underestimated. They have a responsibility to consider the potential impact of disasters on their work. However, many architectural training programs do not adequately prepare students for the challenges of designing for disaster resilience.



Figure 3. Disaster Management Cycle.

Source: Brooijmans (2008), Grothe, Landa &Steenbruggen (2005)

Figure 1 shows Safety Cycle or the disaster management Cycle. It contains the six major interrelated stages, namely; pro-action, prevention, preparation, response and recovery. The process of creating awareness, performing threat and vulnerability analyses, and designing and constructing resilient systems excluding risks is known as Pro-action. The prevention stage is concerned with the minimization of risks and consequences, the installation of forecasting systems, and issuing of regulations and permits this is limiting the risks. An emergency plan is written, the emergency organisation is installed, trained and tested for its Full Operational Capability (FOC), and the materials and equipment needed are made available in the preparation stage. In the response stage, the elimination of sources and side effects is the major focus. The recovery stage is concerned with the evaluation of the response phase and modifications to the emergency plan, the damage is repaired and people are compensated, Grothe, et. al, (2005); Markus, Fiedriech et al, (2004)

Disaster management and sustainable development, according to Ajisafe and Ajide (2015), is no more news that disasters, development and poverty are closely linked. They contended that given the circumstances now faced, achieving sustainable development is of vital importance to every country in Africa. They noted that efforts to end extreme poverty may be reversed in the face of a disaster event and poverty may be re-entrenched. Bakky and Adirika, (2020), said, updating curriculum should be encouraged, however it should reflect changing state of knowledge. Issues that impact society should be considered in curriculum planning and development. Challenges of the society should be

reflected and tackled by students first hand in teaching and learning situations in order to stimulate their thinking processes on how best to resolve issues that face their society.

According to Thabomina, et al, (2020), on challenges to developing and delivering disaster preparedness curriculum, implementation of a disaster preparedness course requires a collaborative effort of all the stakeholders of the locality. Government agencies do not put much focus on students studying in schools and universities let alone students with particular majors like construction engineering and management; they are more concerned about the community as a whole. The position of African countries in disaster management towards sustainable reconstruction development is to be keenly examined for the necessity to train professionals in disaster management and sustainable reconstruction. Disasters is said to occur when hazards and vulnerability meet. It was reported that out of 100% disasters that occur worldwide, only 20% normally affect African nations. However, the 20% that occur makes Africa suffers 60% of all disaster-related deaths Lorette & Tegegn, (1996). This is probably due to the type of hazards that affect this continent or because of the economic situation of Africa. Following this scenario, it is easy for any disaster to escalate or to have multiple effects.

According to Thabomina, et al, (2020), the integration of hands-on practices of rescue activities into construction curriculums, along with theoretical knowledge of disasters, will significantly help students to be prepared for a disaster and for post-disaster mitigation efforts and hence should be included in the disaster preparedness curriculum. They noted that lack of resources and trained personnel is one of the major causes of insufficient integration of disaster preparedness materials in the course curriculum.

According to Abdul-Akeem, (2019) Nigeria, just like any other country, has experienced myriad disasters-some with rapid onset and others with slow onset. These disasters have killed countless lives and inflicted serious damage to the built and natural environments (NDMF 2010). Examples of past disasters in Nigeria include, but are not limited to, the following list:

The Ogunpa flood occurred in Ogunpa, Oyo State, on August 31, 1980, killing over 300 people and destroying properties, including homes, bridges, and vehicles, worth millions of Naira (Tomori n.d.). The causes of the flooding were incessant rainfall over a period of 12 hours and the blocking of drainage systems by garbage previously thrown into the drainage systems by residents (Tomori n.d.).

**Bagauda Dambreak** occurred in Kano State in August 1988 killing 142 people and destroying over 18,000 homes and 14,000 farms, Etuonovbe, (2011). This dam break was engendered by torrential rain-induced flash floods Etuonovbe, (2011).

**Military Cantonment bomb explosions** happened on January 27, 2002 in Ikeja Military Cantonment, Ikeja, Lagos State (NDMF 2010). During the explosions of about 1,000 bombs, which were caused by a

fire that gutted the Ikeja military ammunitions storage unit, some people who were fleeing from the explosions ran into a sewage canal at Oke-Afa, Lagos and drowned, Ana et al. (2007). Over 800 people were killed from the blast impact, drowning, or injuries sustained from the explosions (Akpabio and Alao, (2002) as cited in Ana et al. (2007).

**Abule-Egba fire** occurred on December 26, 2006, after a pipeline was vandalized. The ensuing fire gutted buildings and vehicles, and killed at least 700 people in Abule-Egba, Lagos State, Onuoha, (2009). Those killed by the fire were mass buried while those who were severely burnt, Fadeyibi et al. (2009) and taken to Lagos State University Teaching Hospital for treatment, Fadeyibi et al. (2009). The medical response was carried out by Lagos State Emergency Management Services, Fadeyibi et al. (2009).

**The Abeokuta flood** occurred in the City of Abeokuta, Ogun State on July 26, 2007, as a result of incessant rainfall, which lasted for over 24 hours, Adelekan, (2011). This flood affected over 2,817 people, destroyed over 500 homes and 100 vehicles, and paralyzed social and economic activities for several days Adelekan, (2011). The total infrastructure loss is estimated to be about 3.2 million Naira, Adelekan, (2011).

**United Nations Headquarters bombing** by Boko Haram took place in Abuja, Federal Capital Territory, in August 2011, Murray and Nossiter, (2011). A vehicle filled with explosives was detonated in the United Nations headquarters killing at least 18 people, including United Nations personnel.

**Organization of Disaster Emergency Management:** At the federal level, NEMA is the lead agency for managing disasters through its six zonal offices spread across the country, Fagbemi, (2011). At the state level, the Federal Government mandated the establishment of State Emergency Management Agencies (SEMAs) and at the local level, mandated the creation of Local Emergency Management Agencies (LEMAs), Fagbemi, (2011). All three emergency management agencies are charged with the responsibility of developing capabilities to prepare, prevent, respond to, and recover from disasters

#### **Case Studies and Best Practices of disaster mitigation and sustainable reconstruction.**

Numerous case studies and best practices demonstrate successful integration of disaster mitigation and sustainable reconstruction in architectural training. Examples include universities that have implemented interdisciplinary programs, established research centers, and engaged in collaborative projects with local communities. These case studies serve as valuable resources for developing effective curriculum models and teaching methodologies.

### **Massachusetts Institute of Technology (MIT).**

MIT has a number of programs that focus on disaster mitigation and sustainable reconstruction. The MIT Center for Resilient Cities and Landscapes (CRCL) is a research center that studies how to make cities and landscapes more resilient to disasters. It has a number of projects that focus on disaster mitigation and sustainable reconstruction, including the following: The Resilient Cities Design Challenge is a competition that challenges students to design resilient cities. The Disaster Resilience Academy is a training program for professionals who work in disaster mitigation and recovery. The MIT Urban Risk Lab is a research lab that studies urban risk and resilience.

### **University of California, Berkeley:**

The University of California, Berkeley has a number of programs that focus on disaster mitigation and sustainable reconstruction. The Berkeley Disaster Center is a research center that studies the causes and impacts of disasters. The Berkeley Disaster Center has a number of projects that focus on disaster mitigation and sustainable reconstruction, including the following: The Disaster Risk Reduction Initiative is a research project that studies how to reduce the risk of disasters. The Disaster Recovery and Reconstruction Program is a program that helps communities recover from disasters. The Berkeley Climate Resilient Cities Initiative is a research project that studies how to make cities more resilient

**University of Southern California (USC):** USC has a number of programs that focus on disaster mitigation and sustainable reconstruction. The USC Sol Price School of Architecture has a Center for Disaster Resilience that focuses on the design of resilient buildings and communities. The School has a number of projects that focus on disaster mitigation and sustainable reconstruction, including the following: The Disaster Resilience Design Studio is a studio that challenges students to design resilient buildings and communities. The Disaster Resilience Research Lab is a research lab that studies the design of resilient buildings and communities. The USC Sustainability Initiative is a program that promotes sustainability on campus.

These are a few examples of universities that have implemented interdisciplinary programs, established research centers, and engaged in collaborative projects with local communities to integrate disaster mitigation and sustainable reconstruction into architectural training. There are many other universities that are doing similar work, and the field is growing rapidly.

### **The Disaster Resilient Design Studio at the USC Sol Price School of Architecture**

The Disaster Resilience studio is a research lab that studies the design of resilient buildings and communities. The lab has a number of projects that focus on disaster mitigation and sustainable reconstruction. One of the lab's projects is the development of a new building code that will make buildings more resilient to disasters. The studio begins with a lecture on the principles of disaster

resilience. Students then work in teams to design a resilient building or community. The students are given a set of criteria that their design must meet, such as being able to withstand a hurricane, earthquake, or flood. The studio has helped students to develop the skills and knowledge they need to design resilient buildings and communities.

## **Methodology**

**This study used the qualitative descriptive methods**, literature review was conducted to identify existing research on the topic of disaster management, mitigation and sustainable reconstruction in architectural training. The literature review focuses on the following areas: The role of architects in designing for disaster resilience. The number of institutions offering disaster management and sustainable reconstruction in Nigeria. The current state of the architectural training curriculum. Proposed transformations of the architectural training curriculum. The literature review dealt exhaustively with the subject of curriculum designs in the area of Disaster management and sustainable reconstruction.

Extensive literature review was done for the institutions selected in the area of Disaster management curriculum. Contacts were made through social media and interviews of key participants in the formulations of institutions curriculum in the subject area. The response was collated and analyzed.

**Data Collection:** Primary data was collected through interviews with architectural educators, policymakers, and practitioners. The interviews focused on the following areas: Their views on the need for more sustainable and resilient built environments. Their views on the role of architects in designing for disaster resilience. Their views on the current state of architectural training curriculum. Their views on proposed transformations of architectural training curriculum.

The following are some of the ethical considerations that was taken into account in the research: Informed consent: All participants in the research were given informed consent forms to read and sign. The informed consent forms explained the purpose of the research, the risks and benefits of participating, and the participants' right to withdraw from the research at any time. Confidentiality: All data collected in the research were kept confidential. The names of the participants were not used in any of the research outputs.

## **Findings And Analysis: Institutions in Charge Of Disaster Management in Nigeria**

The management of disaster in Nigeria is segmented to the Federal body namely: (NEMA), National Emergency Agency, (SEMA), State Emergency Agency and (LEMA), Local Emergency Management Agency. However the most visible to the public is NEMA, and this is often visible in times of disaster

occurrence. The two remaining bodies are seldom heard of. ***NEMA, has suggested that Disaster Risk Reduction, should be included in the school curriculum.*** Since its inception, NEMA has embarked on laudable programmes and activities aimed at Disaster Risk Reduction (DRR) and overall disaster management in Nigeria. It has elaborate membership of relevant Government Departments and Stakeholders. Akujobi, (2010). It is believed that the inclusion of disaster mitigation and management in primary and secondary schools and universities curricula would help reduce casualties. It would equip school children on safety measures, especially during and after disasters. School children are among the most vulnerable during disasters. Establishment of Disaster management and sustainable reconstruction after disaster clubs in secondary schools in recognition of the importance of involving young people in disaster management.

### **Institutions in Nigeria Universities Offering Disaster Management and Reconstruction.**

Universities in Nigeria like the University of Lagos, Ahamadu Bello University , Zaria, University of Ilorin, University of Nigeria, Nsukka and the old generation universities have courses for disaster management and risk reduction, but they are not domain in the department of architecture. Most of them are affiliated to Insurance and some other courses.

**University of Lagos:** In the case of university of Lagos degree courses from the bachelor degrees to the doctorate degrees, no curriculum was found stating the teaching of disaster mitigation and sustainable reconstruction. This is the same for all the four universities of Ahamadu Bello University, University of Nigeria Nsukka and the University of Ilorin.

**Caleb University Imota Lagos:** Caleb University, Imota, conscious of the gap created by the lack of a dedicated curriculum in Disaster management and sustainable reconstruction has established a Centre for Innovative Built Environment and Smart city (CIBES). Headed by a professor, Adedeji Daramola, who is the academic deputy vice-chancellor. This is with the aim of holistically tackling several menaces of disasters and other societal issues plaguing the urban built environment. Curriculum embracing disaster management, reconstruction after disasters, disaster mitigation, smart city evolution, and sustainable environmental vision in water, transport and infrastructures are already been drafted for the university. Excitedly this is been promoted by the university using the department of Architecture as a major stakeholder.



**Figure 4.** Proposed Framework for Sustainable Reconstruction Curriculum in Caleb University.  
Source: University of Lagos Website (2023)

**University of Port Harcourt, Nigeria:** Professional Master (M.Sc) Degree in Disaster Risk Management and Development Studies is been offered at the university but not domiciled in architecture department. The Centre for Disaster Risk Management and Development Studies is a collaborating unit of the University of Port Harcourt and the National Emergency Management Agency (NEMA). The Centre was established consequent on the memorandum of understanding signed in November, 2009 between the National Emergency Management Agency and the University of Port Harcourt.

The mandate of the Centre, among others includes the following: Provide a professional Centre of postgraduate Diploma and Master of Science Programmes on Disaster Risk Management and Development Studies. Assist NEMA in training and research in the areas of disaster risk management and development, Establish baseline information for Disaster Risk Management and Development. Work with NEMA to develop research and training programmes to cover the broad spectrum of activities in the Disaster Risk Management Cycle. The main aim of the programme is to provide a holistic academic approach to intended participants to understand Disaster Risk Management and Development issues. The course seeks to provide participants with opportunities for improving their understanding of vulnerability analysis and patterns, conceptual approaches to vulnerability across ecological and social dimensions perspectives. The Centre aims at providing and facilitating education training and research in civil operations particularly operations that require international disaster management, development studies and humanitarian assistance and operations. The Centre will be

used to provide and facilitate education, training, interagency coordination, and research. It will meet requirements for information in connection with regional and global disasters, including the use of advanced communications technology and a virtual library using a fully functional interactive website. The Centre is to develop a repository of disaster risk indicators and baseline for the South-South region of Nigeria.

**Ahmadu Bello University, Zaria:** The Centre for Disaster Risk Management and Development Studies (CDRMDS) was established during the 2009/2010 academic session at Ahmadu Bello University in Zaria, Nigeria. The initiative for the establishment of the centre came from the National Emergency Management Agency (NEMA) in 2008 which recognized the need to create a centre in which to train and develop new disaster risk managers as well as expand research and debate around the issue of disaster risk in the country. Specific objectives with reference to the creation of the Disaster Risk Programme are emphasized as follows: To establish a disaster Risk Management Training and Education Centre in Nigeria. To develop an education and training programme for all disaster risk management practitioners. To establish a multi-disciplinary research team to conduct disaster risk management research in Africa and beyond. To emphasise the vital linkages between disasters, disaster risk management, the developmental process and its consequences on lives, properties and environment.

**Academic Course:** The CDRMDS is currently running two Postgraduate academic programs since mid2010 which include: *Postgraduate Diploma in Disaster Risk Management and Development Studies (PGDRMDS)*, *Master in Disaster Risk Management and Development Studies (MDRMDS)* *Masters of Science in Disaster Risk Management and Development Studies (MSc.)* *Master of Philosophy in Disaster Risk Management and Development Studies (M.Phil.)*. *Doctor of Philosophy in Disaster Risk Management and Development Studies (Ph.D.)*

**Observation.** The results of the research indicate that there is a need to transform global architectural training curriculum to better integrate disaster mitigation and sustainable reconstruction. The interviews with architectural educators, policymakers, and practitioners revealed that there is a consensus on the need for more sustainable and resilient built environments. The participants also agreed that architects play a critical role in designing for disaster resilience. However, the participants also noted that the current state of architectural training curriculum does not adequately prepare students for the challenges of designing for disaster resilience. The participants proposed a number of ways to transform architectural training curriculum to better integrate disaster mitigation and sustainable reconstruction. These proposals included: Incorporating new courses and modules on disaster risk reduction, climate change adaptation, and sustainable design. Providing students with

hands-on experience in disaster preparedness and recovery. Collaborating with other disciplines, such as engineering, planning, and public health. Creating a more interdisciplinary approach to architectural education.

In addition, architectural educators should collaborate with other disciplines, such as engineering, planning, and public health. By taking these steps, a new generation of architects who are better equipped to design and build sustainable and resilient built environments will emerge. Policymakers can support the transformation of architectural training curriculum by providing funding for new courses and modules, and by creating incentives for schools to adopt more interdisciplinary approaches to architectural education. Practitioners can also play a role by supporting the development of new materials and tools for disaster mitigation and sustainable reconstruction.

As Attahiru, and Nabilah, (2020), postulated, the importance of inclusion of Disaster Management Education in Basic and Secondary School Curriculum Education has long been identified as the best medium through which any meaningful change can be effected in society. Although sensitization campaigns through the media and other relevant advocacy programmes can go a long way in increasing awareness of disaster management, there is the need to adequately mainstream Disaster Risk Reduction and Management Education in schools curriculum, so that children can grow well informed about different man-made and natural hazards, which if not adequately managed, can grow into serious disasters in the society, as well as the best ways they can respond and manage disasters. The research has shown that there is a need to transform global architectural training curriculum to better integrate disaster mitigation and sustainable reconstruction. The participants in the research have proposed a number of ways to achieve this transformation. By taking these steps, we can create a new generation of architects who are better equipped to design and build sustainable and resilient built environments.

## **Conclusion**

The research has shown that there is a need to transform global architectural training curriculum to better integrate disaster mitigation and sustainable reconstruction, a number of ways have been proposed to achieve this transformation. These steps will create a new generation of architects who are better equipped to design and build sustainable and resilient built environments. Despite the development of policies, plans and legislation, Africa's direct investments in disaster risk reduction still remain low. Most African countries have limited resources to invest in disaster risk reduction and minimal fiscal space to fund relief and recovery efforts after a major disaster. Governments often lack the capacity to disaggregate specific budgetary allocations to disaster risk reduction education. It is therefore recommended that adequate finance is essential for disaster-risk management and the education of professionals in the field. African nations need to look at this area.

## **Recommendations**

Based on the findings of the research, the following recommendations are made for transforming the architectural training curriculum:

1. Incorporating new courses and modules on disaster risk reduction, climate change adaptation, and sustainable design. Providing students with hands-on experience in disaster preparedness and recovery.
2. Collaborating with other disciplines, such as engineering, planning, and public health. Creating a more interdisciplinary approach to architectural education.

These recommendations are not exhaustive, but they provide a starting point for transforming architectural training curriculum. Taking these steps, new generation of architects who are better equipped to design and build sustainable and resilient built environments will most likely emerge to tackle the problems of paucity of professionals in the realm of disaster mitigation, management and sustainable reconstruction, In addition to the recommendations above, the following are some other considerations for transforming architectural training curriculum:

**Fundings:** The transformation of architectural training curriculum will require significant funding. Policymakers can support this transformation by providing funding for new courses and modules, and by creating incentives for schools to adopt more interdisciplinary approaches to architectural education.

**Curriculum development:** The transformation of architectural training curriculum will require careful curriculum development. Architectural educators should work with experts in disaster risk reduction, climate change adaptation, and sustainable design to develop courses and modules that are relevant and effective.

**Assessment:** The transformation of architectural training curriculum should be assessed to ensure that it is effective. Architectural educators should develop assessment tools to measure student learning in disaster risk reduction, climate change adaptation, and sustainable design. By taking these steps, we can create a more resilient built environment that is better prepared for the challenges of the 21st century.

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