ADAPTING ENGINEERING EDUCATION IN NIGERIA TO THE POST COVID-19 ERA

Engr. Prof. Salawu Sadiku, MNSE

Department of Civil Engineering,

Dean Postgraduate School

Federal University of Technology, Minna, Niger State.

✉ salawu.sadiku@futminna.edu.ng | profssadikov@gmail.com

📞+2348069805416

Presentation Outline

1 Introduction

2 Engineering Education in the Pre-COVID-19 Era

3 New Challenges Associated with COVID-19

4 Engineering Education in the Post-COVID-19 Era

5 Recommendations

6 Conclusion

Introduction

- Engineering education is designed to train students in both theory and practical applications of mathematical and physical sciences, and experience to enable them practice as engineers .

- Engineering, as a profession, has direct impact on the social, industrial and the overall economic well-being of the nation.

- The COVID-19 pandemic has engulfed virtually all nations of the world, and has led to the general lockdown of nations, and expectedly, the operations of tertiary institutions.

- This presentation aims at looking at ways of adapting Engineering Education in particular to the post-COVID-19 era.
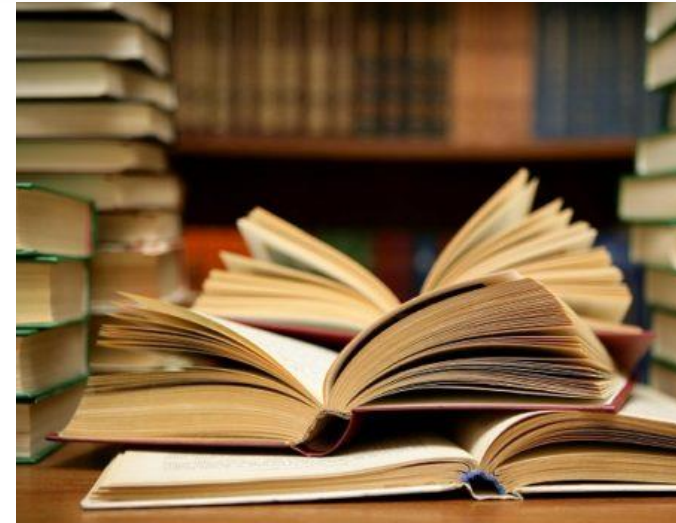
ENGINEERING EDUCATION IN THE PRE-COVID-19 ERA

Pre-COVID-19 Era

- Engineering education in Nigeria has always been a victim of neglect, in terms of adequate investment, quality assurance and robust policy support.

- These challenges have led to many issues affecting the quality of graduate engineers pushed out by Nigerian universities year in year out, especially as regards practical engineering knowledge.

- For the comprehensive adaptation of engineering education to the post-COVID-19 situation, the challenges of pre-COVID-19 era must be considered.

- Shaping engineering education in Nigeria involves an interplay of four (4) stakeholders namely; the trainees, resource persons, academic institutions and the regulatory bodies.

Major Challenges

- Gap between the demand for engineering education and the providers' capacity.

  o Agonizingly, universities keep recording higher student enrollment, than their manpower, facilities (lecture rooms and halls, laboratory/workshop/field work spaces), and equipment can cope with.

  o The desire to promote IGR forces institutions to consider even marginally qualified students for admission.

- Near-absence of the requisite human and material resources for effective service delivery.

  o Up till this moment there is hardly any engineering programme in any of the universities that is adequately staffed in terms of high quality academics and technologists.

  o Only few universities especially the public ones, have laboratory/workshop/fieldwork equipment that can be described as moderately adequate and modern. Others have at best dilapidated/outdated equipment that may not even suffice to train secondary school students in introductory technology.

6

Major Challenges cont.

- Inadequate opportunities for the industrial attachment of trainee-engineers, yet industrial attachment is an essential component of engineering education.

  - The efforts of ITF towards industrial training of engineering students are grossly inadequate in terms of financial support, institution-based supervision, and academia-industry synergy needed to make the scheme a success.

  - The industrial sector is not under any serious obligation to take industrial trainees. They see the exercise more of a favour than a responsibility to the nation.

- Inadequate regulatory support in training prospective engineers.

  - Curriculum is bereft of adequate utilization of computer facilities in line with modern trends.

  - No policy exists in regulating enrollment into engineering programmes of the universities commensurate with available human and material resources.

NEW CHALLENGES ASSOCIATED WITH COVID-19

NCDC Guideline

- Guidelines from health regulatory bodies (WHO, FMH and NCDC).

    o The public and environmental health requirements, as stated in the regulations especially, the acceptable physical distancing may prove difficult for academic institutions to achieve without heavy additional investment.

    o The regulations are even almost impracticable for students to abide by, especially considering the present conditions of students hostels, lecture rooms/halls, workshops, places of worship and other formal and non-formal congregations.

    o Moreover, there are difficulties in enforcing compliance with other regulations, an example of which is the statutory high level of environmental sanitation.
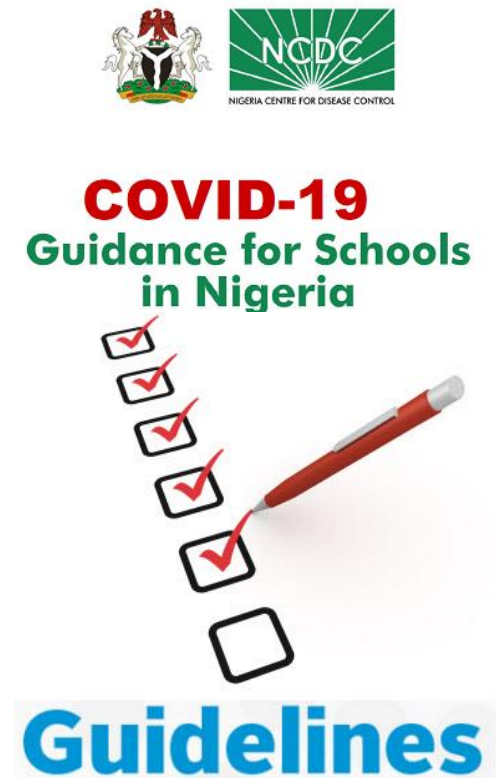
NCDC Guideline cont.

- Uncertainties injected into operations of the universities.

  o Public opinion concerning safety of schools in general and universities in particular is likely to result in fear of early re-opening of the universities.

  o Inadequate facilities for early detection in case of any incidence is a major hindrance to the confidence of the universities in resuming operations.

- Additional stress on the already inadequate national resources.

  o The pandemic is taking its toll on the economy of Nigeria, considering the uncertainties it has injected into the crude oil prices in the international market.
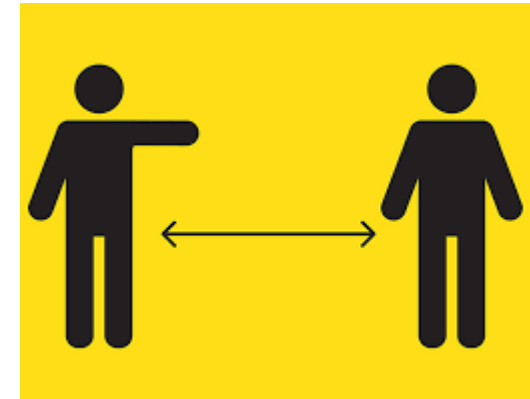
ENGINEERING EDUCATION IN THE POST-COVID-19 ERA

Education in the Post Covid-19 Era

- By post-COVID-19 era, we are simply looking at the time that life generally can have a semblance of normalcy. Because the end of COVID-19 (that is total emancipation of humanity from the shackles of the pandemic) is NOT in sight.

- In the context of the foregoing points engineering education in the post COVID-19 era especially in Nigeria would have to address the following subject areas.

  - o Coursework

  - o Laboratory Practical and Fieldwork

 - o Industrial Training

  - o Statutory Regulations

Coursework in the Post Covid-19 Era

- For substantial compliance with health regulations (which prescribes a threshold minimum distance of one metre between any two individuals, and a high level of personal hygiene) classrooms, laboratories and workshops would have to be re-configured considerably to avoid congregations.

- Holding classes like in the pre-COVID-19 era is completely unacceptable.

- We either unbundle, by creating several streams from large classes or we build larger lecture halls. Both options pose an uphill task considering the amount of investment and time required.

Coursework in the Post Covid-19 Era cont.

- The questionable practicability of the aforementioned options necessitates exploring other possibilities.

- One practical way out of this problem is to take advantage of available opportunities, associated with ICT learning tools, such as online or e-learning and Virtual learning systems. A hybrid approach that blends minimal conventional and ICT systems may offer the best solution, now.

- Graphics and illustrations using ICT tools serve to enhance engineering training over ICT enabled system.
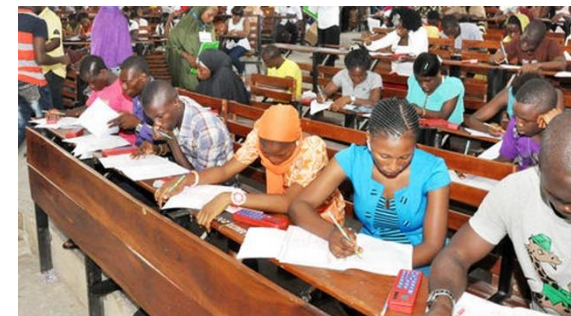
Experimental/ Field Work

- This is a major component of engineering training. However, it cannot be conducted using the conventional procedure whereby large groups of students can mill around equipment while the coordinator demonstrates to the students.

- Considering the constraints on these facilities even before COVID-19, unbundling is completely out of the way.

- The current trend is moving in the direction of adopting Augmented Reality (AR), Virtual Reality (VR) and 3D animation to teach laboratory experiments to students at a distance.

15

Industrial Training

- The conventional conduct of the SIWES training may run counter to the restrictions imposed on organisations by the health regulators.

- As a result, we may have to introduce partial industrial training via Augmented Reality (AR), Virtual Reality (VR) and 3D animation, as an integral part of the academic training.

- Introduction of this system would involve a review of the academic curriculum.

RECOMMENDED COURSE OF ACTION

General Recommended Course of Action

- The regulatory bodies should intervene in the enrollment into engineering programmes to match enrollment with the human and material resources available for running the programmes.

- Formalize through government policy, the need for the industrial sector to take SIWES training as a bona fide corporate social responsibility.

- The institution may have to run staggered calendar in contrast with the conventional practice which demands that everybody has to be in school at the same time.

Recommendations on Coursework

- Unbundling of large classes is strictly inevitable. That calls for engagement of additional competent hands that for now are in short supply. A stop-gap measure can be by way of re-engaging retired university staff for the purpose of augmenting the serving faculty members.

- The use of ICT tools to augment the conventional system is inevitable.

- University proprietors should be made to commit more resources in the procurement of equipment and facilities to provide enabling environment for e- or online and virtual learning.

- The Information Technology Services arm of the training institution should be considerably expanded in scope and equipment to cope with this new mode of learning.
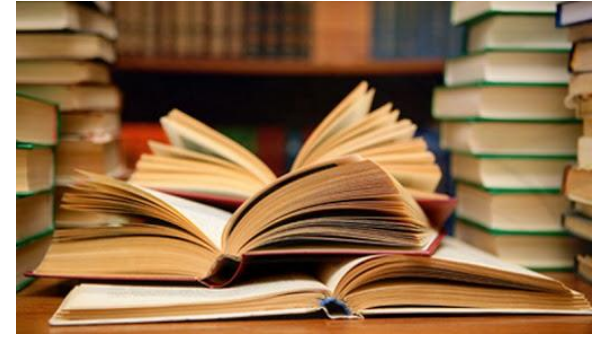
Recommendations on Coursework cont.

- The situation has brought to the fore the necessity to review the training curricula with a view to minimizing extraneous items to make way for computer based courses.

- Hybrid system, that is, blending conventional classroom approach with online or virtual learning components will help to reduce social contacts in the university community.
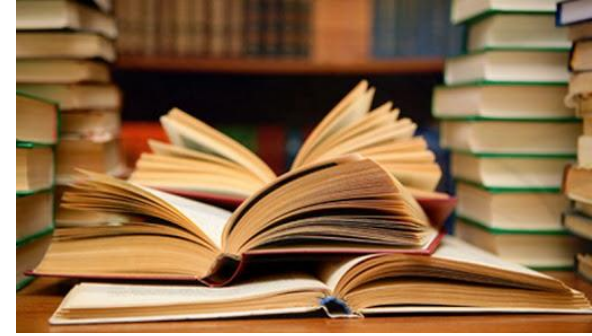
Recommendations on Laboratory/Field Work

- Abundant use of Virtual Reality (VR), Augmented Reality (AR) and 3D animation should be introduced not only for the purpose of achieving COVID-19 requirements but also to re-position our engineering education in line with the international best practices.

- The workability of the foregoing calls for a tripartite effort between the academic institutions, the students and the government. While the institutions provide the equipment and facilities, government is expected to provide the enabling environment such as power, communication facilities among others while the students will prepare to make the best out of the situation.
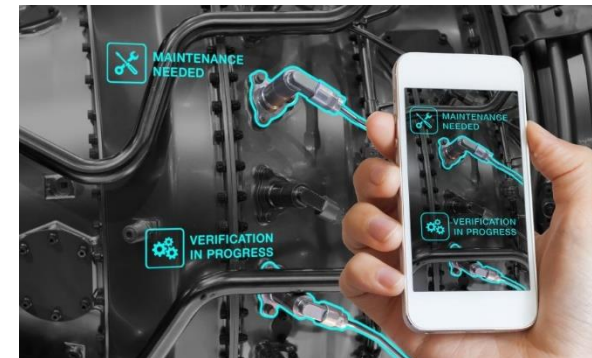
Conclusion

- COVID-19 pandemic has introduced severe constraints on engineering education that are likely to linger on for quite some time.

- As we discuss the post COVID-19 era, it must be borne in mind that true normalcy as was known in the pre-COVID-19 era may only be expected in a very long time to come. Therefore, we can only talk about semblance of normalcy which implies that we would have to adjust and live our lives within the challenges of COVID-19.

- Most of the challenges in the era preceding COVID-19 have been further worsened, while new challenges are introduced.

- Post COVID-19 training of engineers will rely largely on computer-based technology through online and virtual learning in contrast with the conventional training which is principally classroom-based.

- Finally the situation is gravitating towards adopting work-integrated-learning (WIL) system which injects industrial tradition and culture into the training of engineers right from the commencement of academic training.

THANK YOU