



Implementing Outcome Based Education in Nigerian Universities Engineering Programmes.

BY

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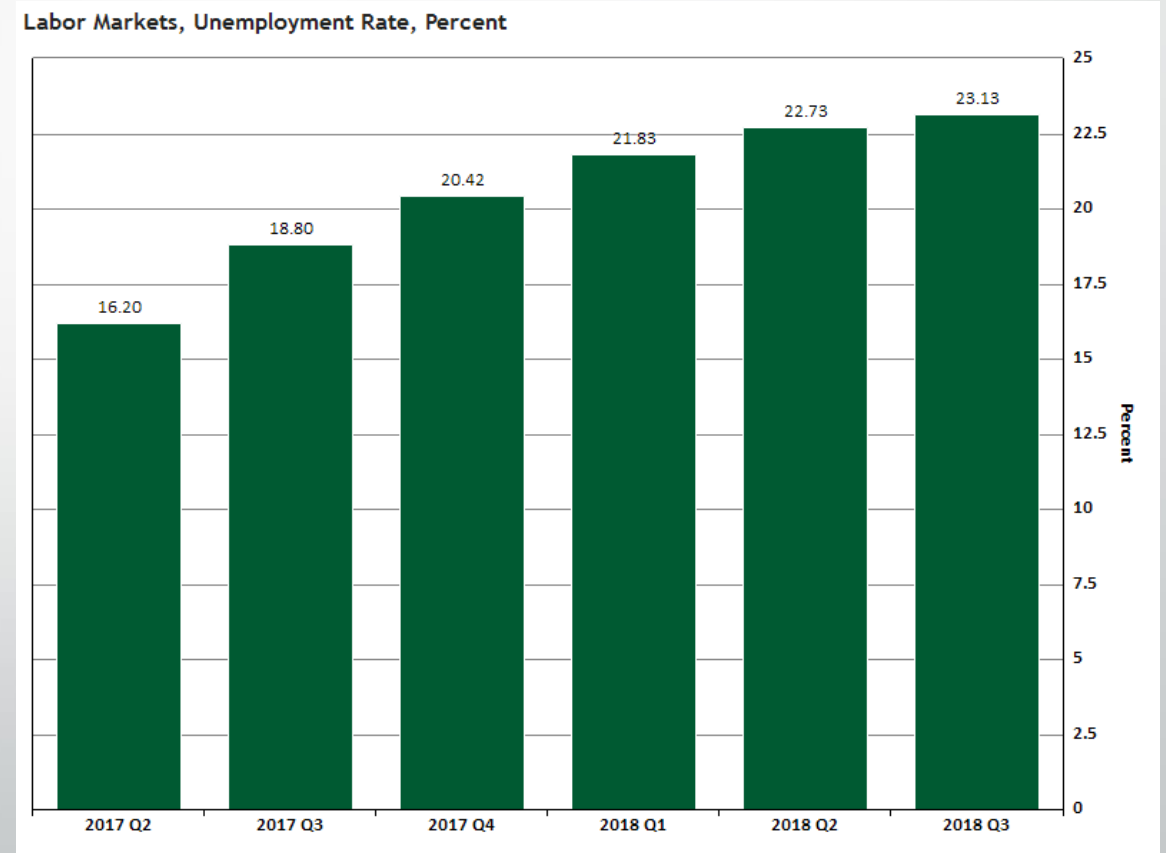
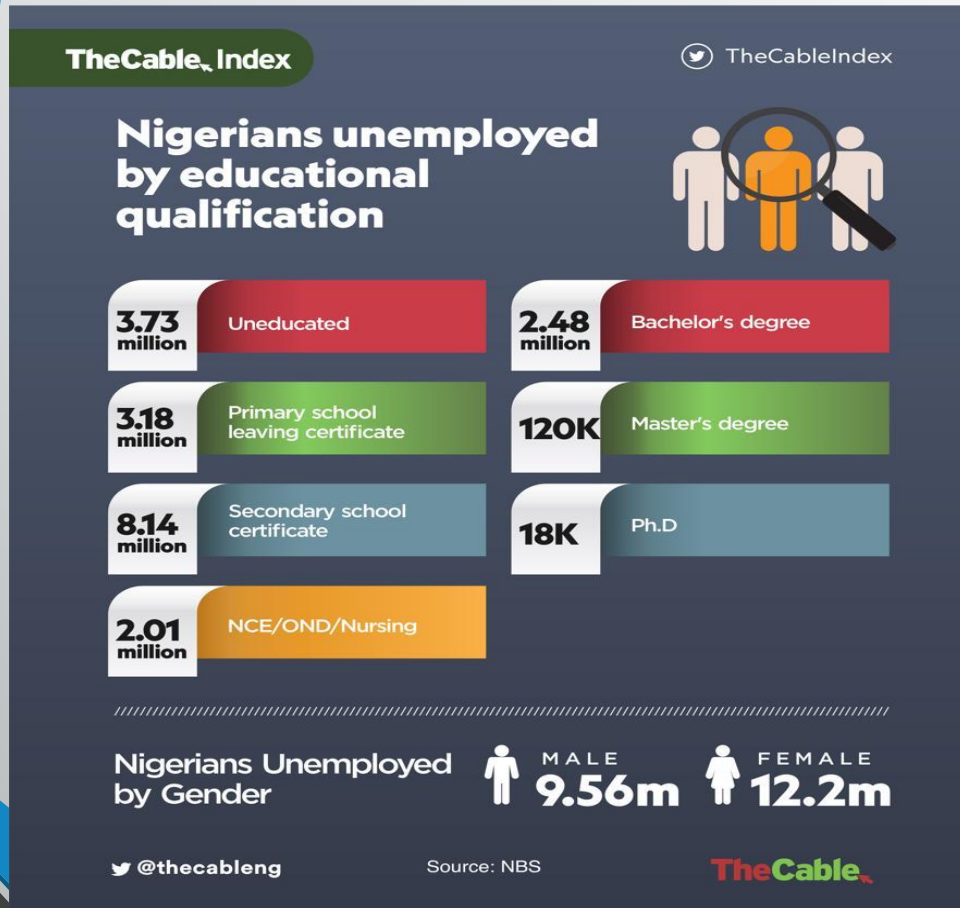
INTRODUCTION

- Education is useless if it cannot guarantee wellbeing of the certified and the health and safety of the Nation.
- Regulation is worthless if it lacks the vision to create wealth for the regulated.
- We have more of the angry and selfish citizenry because the Regulatory Agencies have failed.

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- COREN is 50 years
- Help COREN to Regulate

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Engineering Personnel in COREN Register 2020

- Total Number of Registered Engineers – 56,327
- Total Number of Engineering Technologists – 5,549ET
- Total Number of Technicians – 867T
- Total Craftsmen – 2,701C
- Total expatriates – P1,610

- Today's Registered Chemical Engineers with COREN
 - Civil – 16,054
 - Electrical - 13,444
 - Mechanical – 10,333
 - Chemical – 3,205
 - Electronics – 1,058

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- Number of Students per year
- JAMB admits over 500,000
- Engineering Institutions admit about 20%
- 4 PhD and 200 Master's Holders applied for N20,000/month N-Power Job placement

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- Strong disproportionate representations between the and registered
- Poor regulation of engineering practices
- Poor understanding of the essence of COREN
- No value in what we consider as useless

TABLE 12.1

NUMBER OF ENGINEERS REGISTERED IN 2019

S/N	TYPE OF ENGINEERS	NUMBER REGISTERED IN 2019		TOTAL
		MALE	FEMALE	
1.	AIRCRAFT	2	0	2
2.	AERONAUTICAL	8	0	8
3.	AEROSPACE	3	0	3
4.	AGRICULTURAL	277	47	324
5.	CHEMICAL	507	126	633
6.	CIVIL	1,837	160	1997
7.	COMMUNICATIONS	7	0	7
8.	COMPUTER	136	125	186
9.	ELECTRICAL	1,907	125	2,032
10.	ELECTRONICS	148	29	177
11.	FOOD	2	1	3
12.	GAS	3	1	4
13.	INDUSTRIAL	9	0	9
14.	MARINE	30	0	30
15.	MECHANICAL	1,440	58	1,498
16.	METALLURGICAL	116	32	148
17.	MINING	19	2	21
18.	PETROLEUM	97	14	111
19.	POLYMER	16	0	16
20.	PRODUCTION	27	0	27
21.	SOFTWARE	27	0	27
22.	SYSTEMS	7	0	7
23.	WATER RESOURCES	29	1	30
TOTAL		6,627	721	7,348

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The 2020 Nigeria Budget

- 2020 FGN spending is projected to be **N10.59tn** is 18.8% higher than 2019.
- Recurrent(non debt) spending expected to total **N4.84tn** is 45.7% of total expenditure, and 10.3% higher than 2019, (reflecting increases in salaries & pensions including provisions for implementation of the new minimum wage).
- Aggregate Capital Expenditure of **N2.78tn** is 26.2% of total expenditure; and 12.6% less than 2019.
- At **N2.45tn**, debt service is 23.2% of total expenditure, and is 14.5% higher than 2019.

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Presidential Executive Order 5

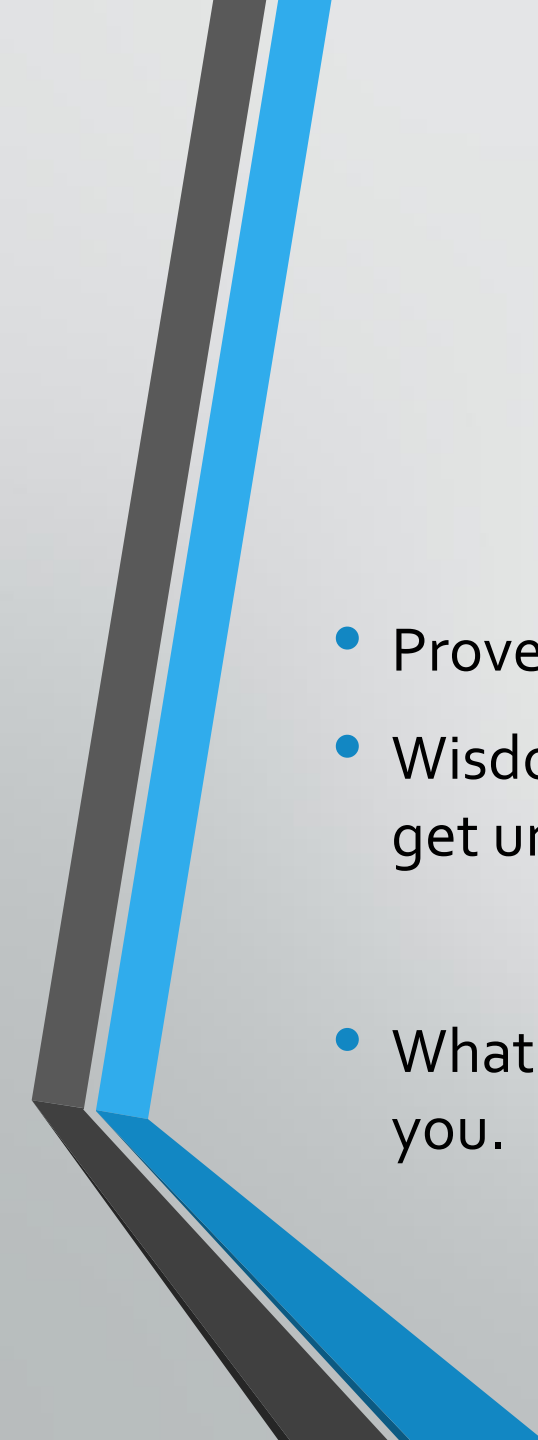
- It is impossible to implement without ensuring the quality of engineering Students and Graduates
- Capacity Building as integral part of Capital Budget Implementation
- Training for young graduates with established with well established Industries
- Monitoring of Local Content

COREN ACT 2004

- Ensuring capacity building and monitoring local content development in the Nigerian engineering industry through –
 - Mandatory attachment of Nigerians to expatriates engineers on major projects to understudy them from inception.
 - Ensuring that all foreign engineering firms establish their design offices in Nigeria.

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- Pre COVID-19
- COVID-19
- Post COVID-19
- Engineering Education and Practices cannot remain the same

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- Proverbs 4:7
 - Wisdom is the principal thing; therefore get wisdom: and with all thy getting get understanding.
 - What you remembered was not part of you. What you think about defines you.

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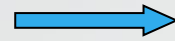
Create New Paradigm – Outcome Based Education

- Education must meet societal pains
- It is effective when all stakeholders contribute their quota

Comparison of OBE and Traditional Education Systems

Traditional education process focuses on the inputs.

Input



Process

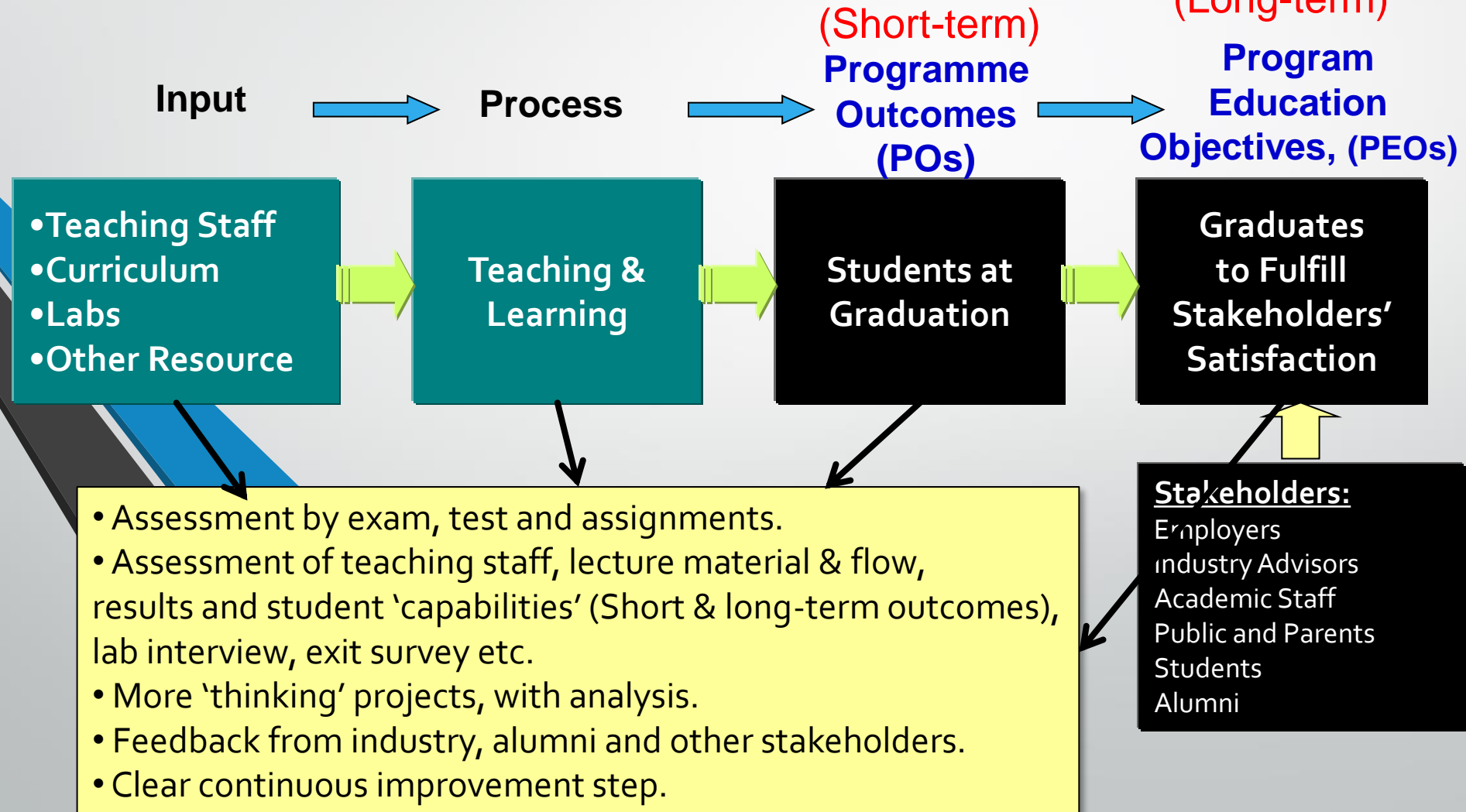
- Teaching Staff
- Curriculum
- Labs
- Other Resource

Teaching & Learning

Students at Graduation

- Assessment mainly via exam, test, assignments.
- Quality control from teaching evaluation.

OBE shifts from measuring input and process to include measuring the output (outcome)
(Long-term)



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What is Outcome Based Education OBE

- It is an educational philosophy that states education ought to aim at giving students a particular, minimum level of knowledge and abilities as the major educational outcomes.
- It is about placing thinking above Remembrance
- It is about building tangible and intangible Structures for creative learning
- Graduating market ready students: measure their effectiveness at graduation and 5 five years later.

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Knowledge levels for assessment of Outcomes based Education

Level	Parameter	Description
1	Knowledge	It is the ability to remember the previously learned material/information
2	Comprehension	It is the ability to grasp the meaning of material.
3	Application	It is the ability to use learned material in new and concrete situations
4	Analysis	It is the ability to break down material/concept into its component parts/subsections so that its organizational structure may be understood
5	Synthesis	It is the ability to put parts/subsections together to form a new whole material/idea/concept/information
6	Evaluation	It is the ability to judge the value of material/concept/statement/creative material /research report) for a given purpose

Graduate Attributes in Outcome Based Education

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Every Course outcome is a contributor to the programme outcome



3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

Your depth of thinking determines the excellence of the product



4. Conduct investigations of complex problems: The problems: that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline.

A) that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions.

B) that require consideration of appropriate constraints/requirements not explicitly given in the problem statement. (like: cost, power requirement, durability, product life, etc.) which need to be defined (modelled) within appropriate mathematical framework.


C) that often require use of modern computational concepts and tools

The market shall always go for product friendliness, beauty, cost

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5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to complex engineering activities, with an understanding of the limitations
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

We begin to fail as Engineers when we live outside

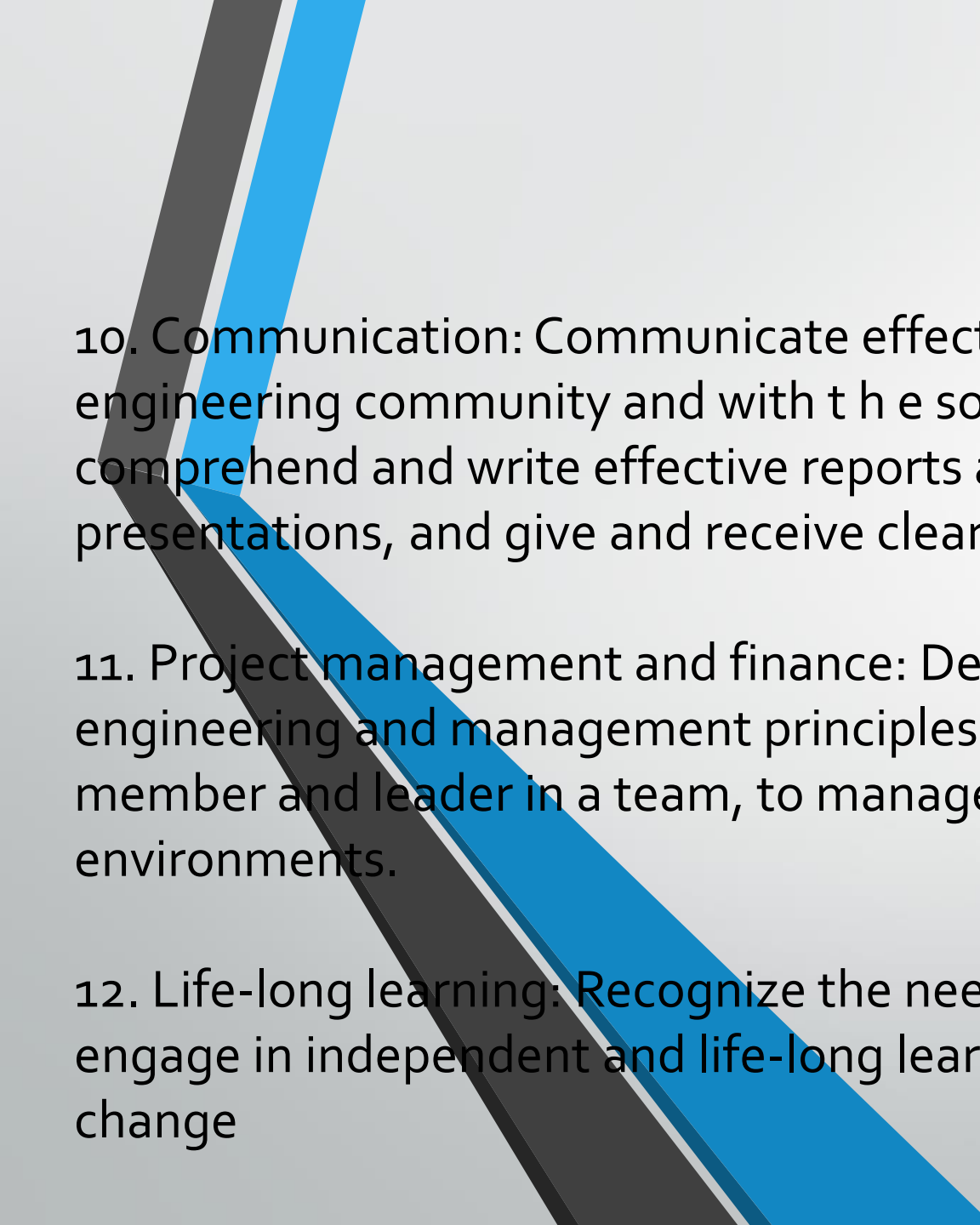


7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

My thinking is partial



10. Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

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Characteristics of OBE curricula

- It has Programme Education Objectives (PEOs), Programme Outcomes (POs), Course Learning Outcomes Performance Indicators
- It is objective and outcome driven, where every stated indicators are assessed and evaluated
- It is centered around the needs of the students and the stakeholders
- Every outcome is intentional
- Programme outcomes focus on students abilities
- Outcomes address the cognitive (thinking, knowledge), psychomotor (doing, skills) and affective (feeling and attitudes) domains to be attained by students.
- Course outcomes (COs) must satisfy specific programmes outcomes embodied in the Institution vision

Teaching or learning method may have to be integrated to include different delivery methods to compliment the traditional lecture method

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What COREN wants from all stakeholders?

The Federal Ministry of Works and Housing, Federal Ministries of Education, and Science and technology, the manufacturers Association of Nigeria, the National Universities Commission, Local Content Development Board, etc.

- Actively commit and support Engineering education
 - Industrial Training Scheme in Engineering
 - One year post graduate training programme in a relevant industry
 - Conceptualized in 2004 but never took off
- The Implementation of Presidential Executive Order 5
 - Training project.

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Progress Made

- Full Commitment of Federal Ministry of Works and Housing
- Signed MOU with GIZ and They have Completed the Interview for engaging about 20 personnel
- To Sign MOU with SPDC.

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- **WORK PLAN**
- Webinar of Stakeholders scheduled for the 8th September 2020
- Set up a Stakeholder Committee on the Implementation of OBE
- Confidence starts knowing the home is supportive

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Implementation Strategies

- Have a COREN desk in the Ministry to enforce implementation of the mandates.
- Utilizing the Training and Research budget in all Federal Ministry of Education contracts to engage trainees/internees
- Indexing of all Engineering students in the Tertiary Institutions
- Ownership of COREN by Stakeholders

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- What COREN wants from the Universities
- Total commitment to Implement OBE in Engineering Programmes
 - This is a long and tedious path of restructuring engineering pedagogy
 - Documentation of all processes
 - Building new relationship with Stakeholders



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- COREN commits to creating the enabling environment with and for all stakeholders



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Thank You and God Bless