E-learning opportunities for engineering education

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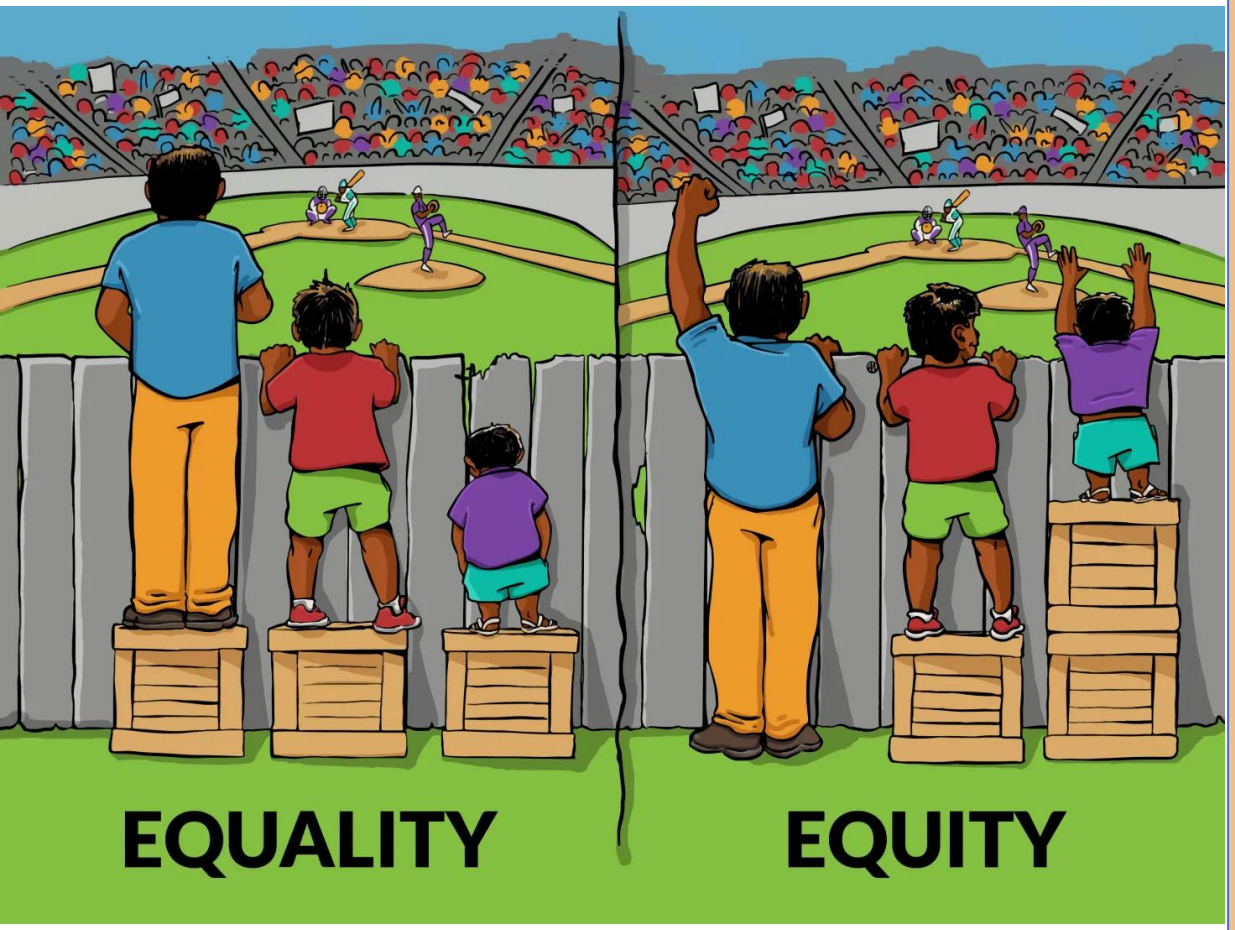
Global Challenges in education

- Growing populations & growing demand for education
- Challenges with quality of education
- Changing market demands
- Rising costs of education
- Diminishing public expenditure in higher education
- No teachers or untrained/undertrained teachers

What are the key issues & challenges in education in SSA?



Equity
Relevance
Financing
Access
Technology
Quality

Global Predictions on Populations

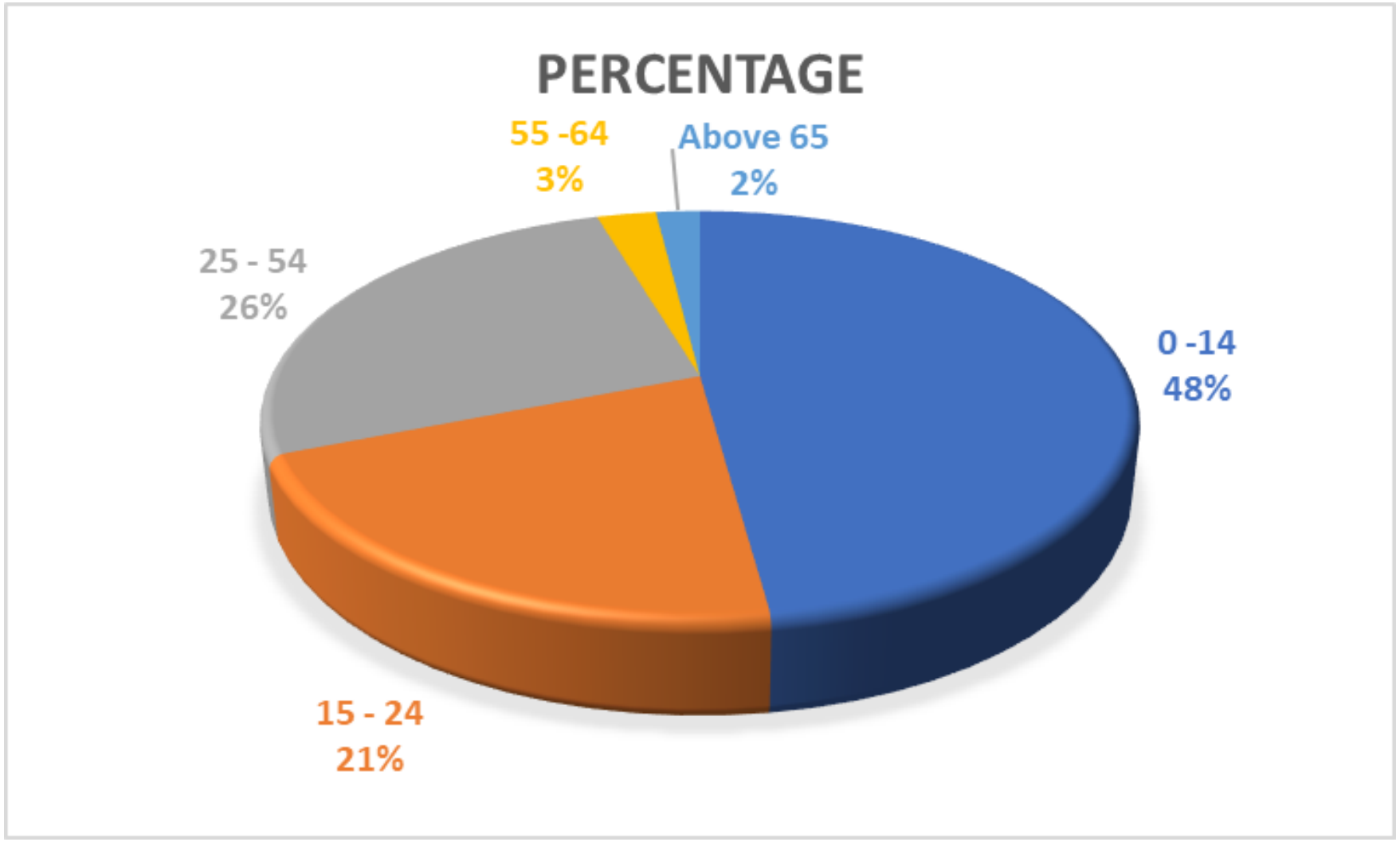
- Populations will grow from 7.7 (2019) billion to 8.6 billion by 2030
- 4 million - 60% living in urban areas

- Migration will also increase further
- Uganda - 45.9 million (2020)

Global Predictions on Jobs

- 2 billion jobs will disappear
- Most will come back in different forms
- Most jobs will be freelance projects rather than full-time jobs
- New skills and competences needed
  - Learning and innovative skills
  - Information media and technology skills
  - Life and career skills

Population: Age Structure in Uganda



Pop: 40,853,749

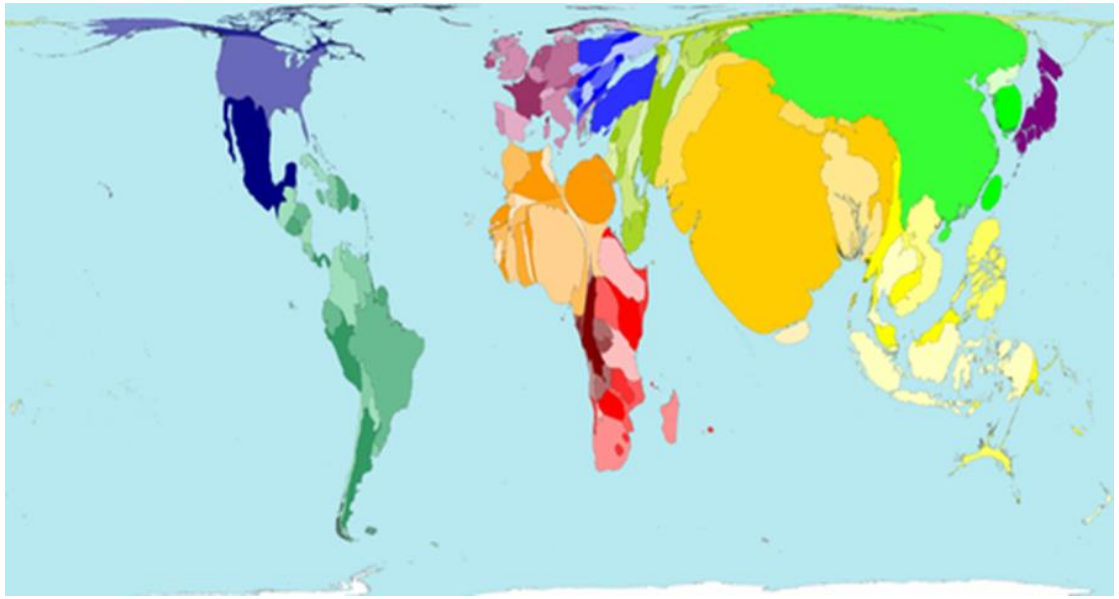
2018 Est

0 -24 years = 69%
28 million

https://www.indexmundi.com/uganda/age_structure.html

School enrolments have gone up BUT in Uganda

- Transition rates are very low
- Quality remains a challenge
- Disparities remain
  - ✓ Gender, regional
  - ✓Economic status
  - ✓Quality
  - ✓Infrastructure remuneration
  - ✓Policy e.g. Promotion of Science



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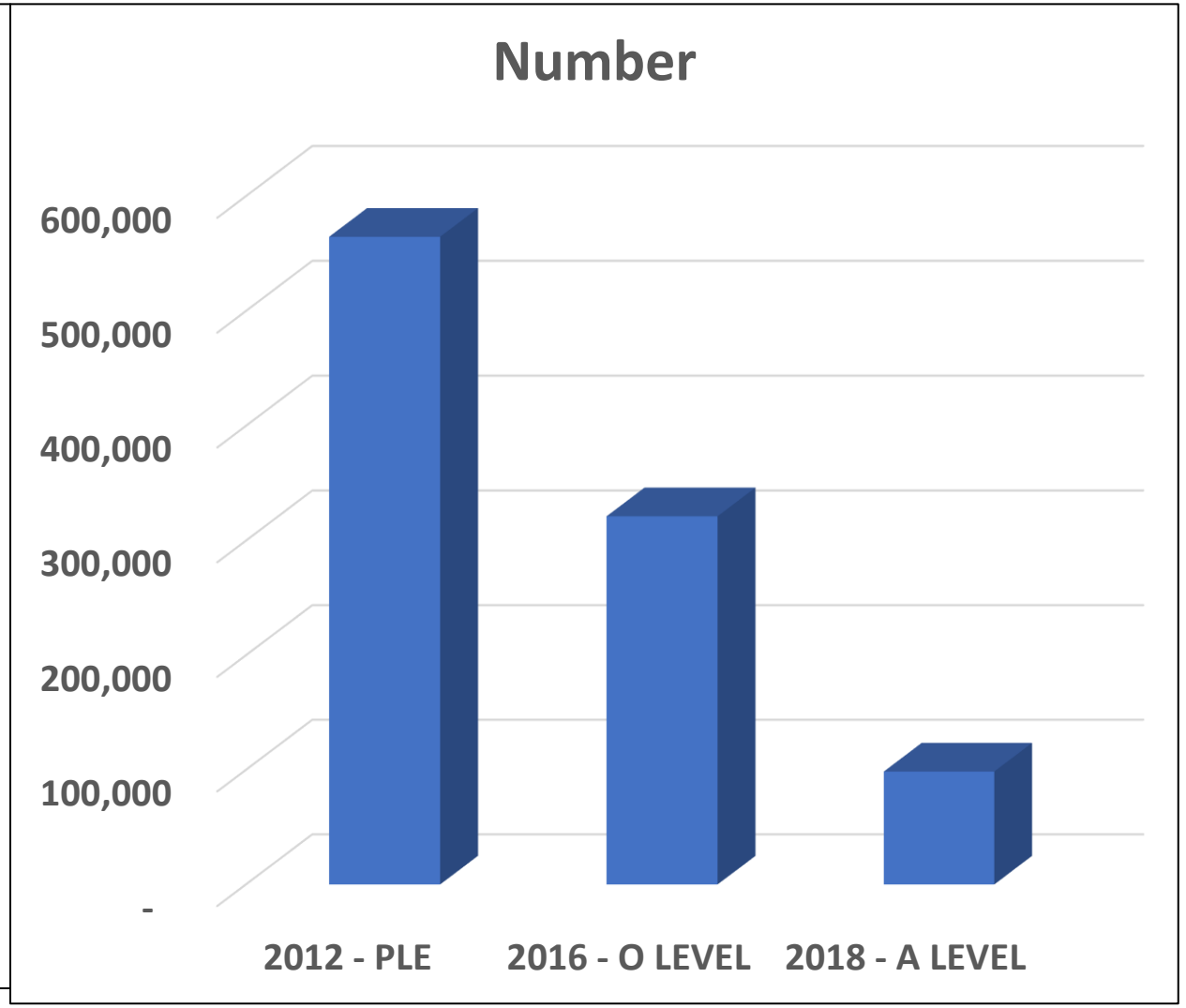
- **Tertiary Education Sector NOT coping with pressure/demand**

(Naamara, Nabasumba, Nabadda 2017)

Transition rates In Uganda

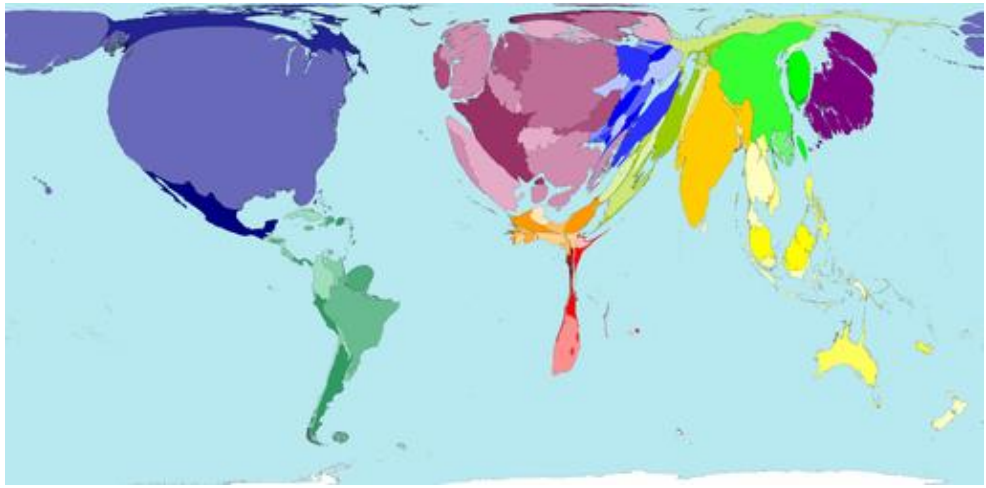
- Primary enrolments high
- Transition rates are low
- 57% of those who sat PLE Ultimately sat O Level
- 17% of those who sat PLE eventually sat A Level
- About 11% eventually joined Universities
- Huge wastage in education system
- Selective system reinforces inequalities



CIA World Factbook 2018

Tertiary Education Spending

- Government spending on education is only about 5% of Gross National Product (GNP)
- Heavy dependence on foreign aid to finance budgets
- Decreased public financing of higher education
- Liberalization and commodification of education
- Increasing rich-poor divide



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Distance Education - Terminologies

- Teachers and learners are separated
- An institution involved
- Technology a major tool
- Variety of methods employed
- Flexibility in terms of technology, when, where & how

Why ODeL?

- Increasing **Access**
- Enhances **Equity**
- Cost – **effectiveness** and cost **efficiency**
- **Flexibility** – anytime, anywhere & anyhow
- **Relevance –** Can be used for retraining/retooling
- **Quality** - has potential to address quality issues

ODeL Generations

1st Correspondence

- Print, Post, Audio tapes
- No interaction between student/ tutor/ student
- Cognitive pedagogy

2nd Distance Education

- Print materials, Radio, TV, Telephone, & Face to face sessions
- Use of multimedia
- Student/tutor/ student interaction
- cognitive-behaviourist pedagogy

ODeL Generations

Open Learning

- Print, Post, Radio, TV, Telephone, Electronic m
- Use of multimedia
- Student/tutor/ student interaction
- cognitive-behaviorist pedagogy
- Promotes openness

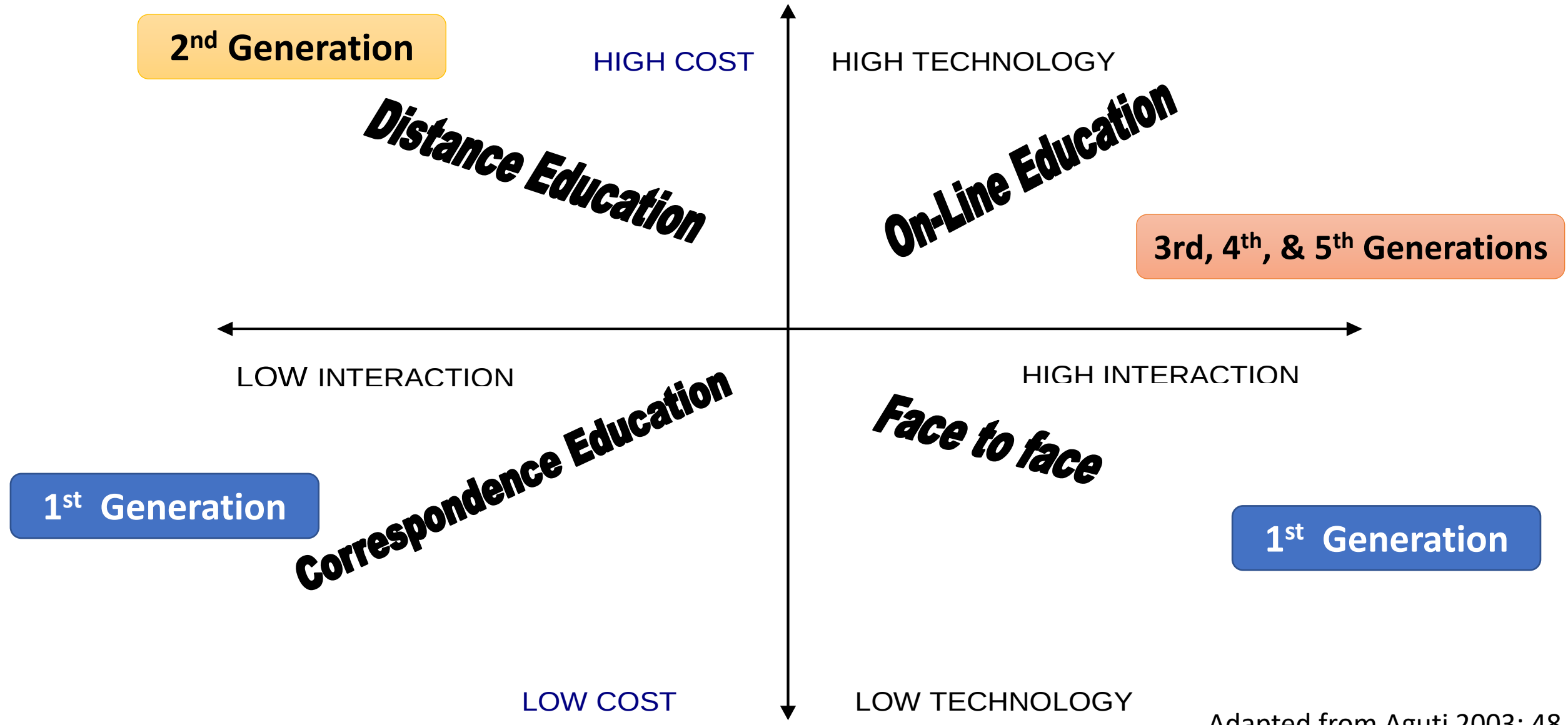
E Learning

- Internet, WWW, Audio-visual
- Employs multimedia
- Student/tutor/ student interaction
- Connectivist & Social-constructivist pedagogy

Blended Learning

- On campus
- Traditional methods
- Web-based/ e learning
- Independent learning

Generations, Cost & Interaction in different forms of Distance Education



Adapted from Aguti 2003: 48

E Learning Opportunities

Massive Open Online Courses (MOOCs)

A private company whol Future Learn UK
https://www.futurelearn.com/

coursera
education for everyone

For-profit educational technology company
https://www.coursera.org/

edX

The leading global universities of the edX consortium
https://www.edx.org/

canvas NETWORK

Canvas Network offers open, online courses taught by educators everywhere
https://www.canvas.net/

https://www.classcentral.com/report/mooc-stats-2018/

Massive Open Online Courses (MOOCs)

- Distance education courses
- Most run by Universities
- Open to anyone who registers
- Could admit thousands of students in any course
- Flexible – anytime & anywhere
- Majority of certificates are non credit
- Some Universities now permit aggregating MOOCs for Certification e.g. University of the People (tuition-free, accredited, online, American university)
  - Students pay US$ 100 Certification fee for each course

Examples of MOOCs for Engineers

https://www.coursera.org/

1. Introduction to Engineering and Engineering Mathematics, **edX**
2. Introduction to Engineering Mechanics, **Coursera**
3. Engineering Systems in Motion: Dynamics of Particles and Bodies in 2D Motion, **Coursera**
4. The Engineering of Structures Around Us, **edX**
5. Fundamentals of Audio and Music Engineering, **Coursera**
6. Introduction to Systems Engineering, **Coursera**
7. Introduction to Aerospace Engineering, **edX**
8. Fundamentals of Fluid Power, Coursera
9. Mechanical Behavior of Materials, **edX –**
10. Sports and Building Aerodynamics, **Coursera**

https://www.edx.org/

MOOC Providers

The 33 MOOCs from around the world are from:

1. China
2. France
3. Germany
4. India
5. United Kingdom
6. United States of America
7. Japan
8. Korea
9. Russia
10. Taiwan
11. Ukraine
12. United Kingdom
13. United States of America

Top five MOOC providers by registered users:

1. Coursera — 37 million
2. edX — 18 million
3. XuetangX — 14 million
4. Udacity — 10 million
5. FutureLearn — 8.7 million.

Where is Africa? Can Makerere take advantage of this opportunity?

Class Central 2011 – 2017 https://www.class-central.com/report/mooc-providers-list/

Open Educational Resources (OER)

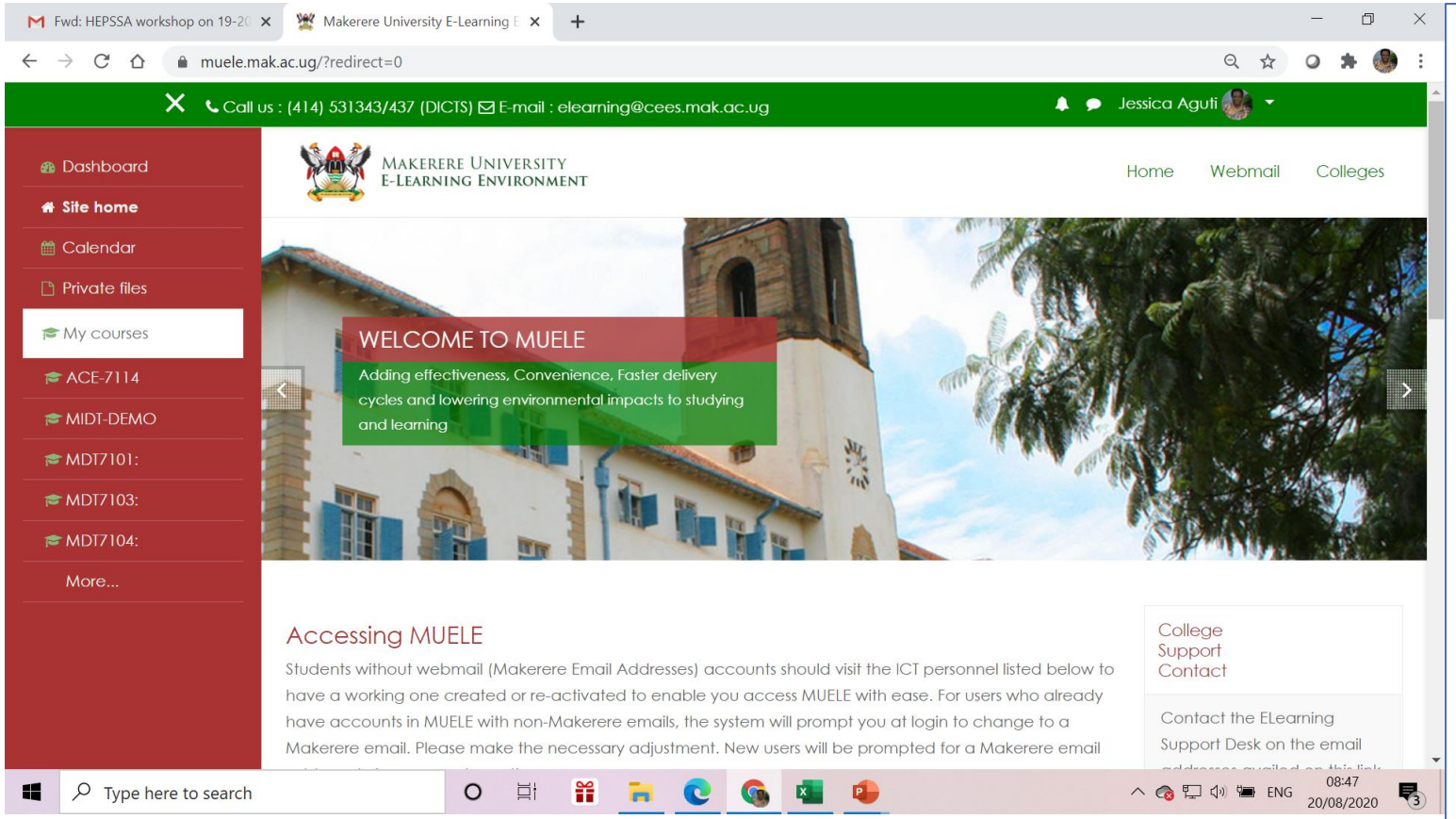
- UNESCO - OER "refer to the **open provision of educational resources,** enabled by information and communication technologies, **for consultation, use and adaptation** by a community of users for non-commercial purposes." (UNESCO 2008)

- “Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials or techniques used to support access to knowledge.” (Hewlett 2008)

Why OER?

- Provision of quality teaching/learning materials
- Enrich teaching and learning
- Facilitate creation, utilization & sharing of information
- Promote acquisition and utilization of higher order learning skills (analysis, evaluation, synthesis…) for BOTH students and staff
- Potential source of learning materials for ODL programmes
- Provides opportunity for international collaborations

Learning Management Systems

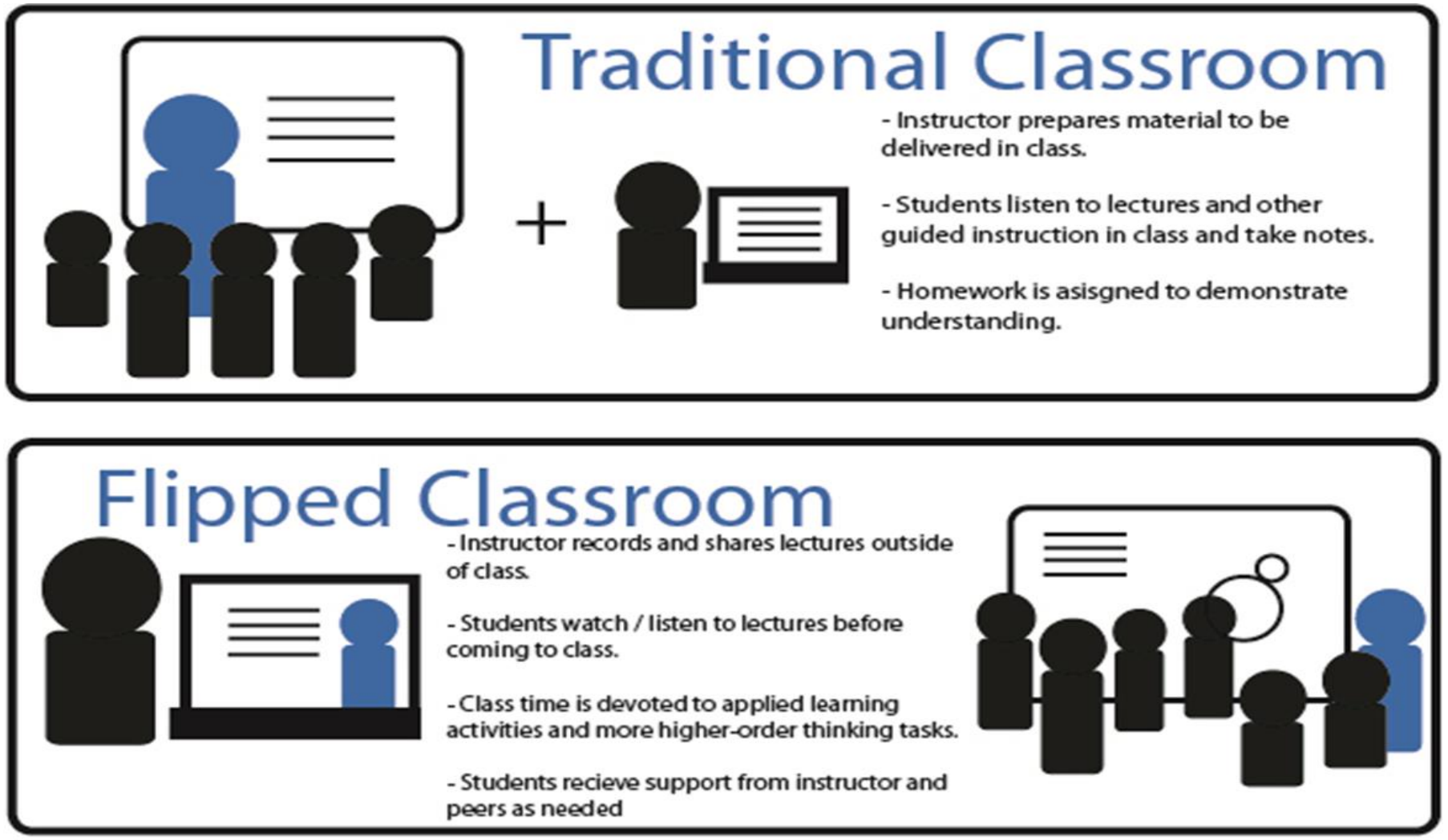


Opportunity to blend technologies and methodologies and to flip activities

MUELE Affordances

- Discussion Forums
- Chat Rooms
- Monitor Attendance
- Assignments
- Quizzes
- Feedback
- Surveys
- Wikis
- Resources
- Integrate external apps e.g. google docs
- etc

Flipped classroom



http://bit.ly/1r0UUE3

Retrieved 5th Sept 2014

Prospects of ODeL for Engineers

Increase access to University education	• **UPE & USE bulge** • **Accommodate adults returning to school** • **Democratize access to higher education**
Improve quality of education at the University	• Access to high quality learning materials • Increased collaborations • Use of problem based instruction, experiential and flexible learning • Promote independent, creative, critical thinking

Prospects of ODeL Engineers

Address inequalities in Uganda's education and achieve equity	• **Open up access to include disadvantaged groups** • **Flexible learning options**
Exploit potentials ICTs present	Technology can be used to bridge the gap between teachers/students; students/students • Use of E mail, Chat rooms, Discussion fora, Wikis, E portfolios, File sharing, Text messaging & social media

Food for thought

The future belongs to those who prepare for it today

Malcom X