LEVERAGING *DISRUPTIVE TECHNOLOGY* FOR HIGHER EDUCATION IN NIGERIA

By

Dr. Pauline Ann Baba (EdD/ET, MNCSS, MAECT, MAACE, FCENT)

Director, Information Technology Resource Centre (ITRC)

Kogi State University, Anyigba

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Introduction

- Higher education generally have a reputation for being slow to adapting new things and technology is no exception.
- There is no denying how disruptive some technologies can and have been to education in recent year.
- It is therefore not surprising that the word **"Disruptive Technology"** came from an authority in academics.
- Disruptive technology is a word coined by a Harvard business School Professor **Clayton M. Christensen**.
- This word was first used in his book *"The Innovators Dilemma – Management of Innovation and Change" (1997)*, in this book, he categorized new technology into two: sustaining and disruptive technology

Technology Categorized

- **There are two major categories of technology:**

1. **Sustaining technology:** sustains the status quo by using technology to make incremental improvement and changes to an already established and existing technology.
2. **Disruptive technology** does not recognize existing procedure, lacks refinement, have no proven practical application, often laden with initial performance problems, and appeals only to a limited audience

Disruptive Technology Defined

- Disruptive technology is any technology that displaces an established technology modus operandi and shakes up the industry and institution.
- It is an innovative ground-breaking piece of technology that creates a new market, new value network, and new industry by disrupting an existing system.
- According to Clayton M. Christensen, a Harvard Business School professor, a “disruptive technology is a new emerging technology that unexpectedly displaces an established on”.

Disruptive Technology…

Has affected virtually all spheres of our lives

Characteristics of disruptive technology

- New
- Unrefined: work in progress
- Performance issues: no previous evaluation or track record, thus hard to evaluate/assess performance
- Known to and appreciated by limited people
- Not popular
- No proven track record thus hard to sell
- Drastically alters lives
- “Destroys” existing structures

SAMPLES of Disruptive Technology

- Typewriter displaced hand written notes
- Personal computer (PC) replaced typewriter
- Phone has displaced the Post Office
- SMS displaced Letter Writing
- Email had displaced Fax
- Email has virtually changed normal ways of communication
- Internet displaced the library
- Google displaced the Dictionary
- Wikipedia displaced Encyclopaedia
- Handheld devices and laptops changed the work place to mobile. Instead been stationary at the desktop to work, the world is our workplace (park, car, bedroom, even toilets).
- Technology has killed normal conversation where we actually see the other person's feelings and expressions. In short, it has replaced visiting each other and gathering at meetings by replacing it with video calls, video chats, use of apps like Maco Polo, etc we no longer find it necessary or important to meet in person.

Disruptive Technologies in Higher Education

- **Mobile internet:** is increasingly popular, expensive, and capable piece of technology making internet connectivity available everywhere. Mobile internet has made education, farming, and doing business easy and different with the use of simple apps
  - For example, use of smaller devices, mobile apps for banking platforms, sales (use of Instagram or Youtube), and apps for chronic illness diagnosis, and treatment through remote monitoring systems and producing radical changes.

Mobile internet continues…

- For instance, on my last visit to the US, here I was in a town I leaved for 14years, my friend always hands me her car keys whenever i visit instead of chauffeuring me around and she said "just use Google map on your phone if you get lost".
- I remember way back in the 1990s when if you want to travel from one part of the US to another you have to be signed up and pay yearly membership with a company (AAA) that sends you directions in the mail, this means planning your trip weeks ahead and announcing to the whole world. Then we moved to MAPQUEST where you just print your direction from Yahoo website (No Google then).
- After this, we bought this piece of technology (GPS) that was mounted in our car that actually tell us to *take I75 to Johnson street and make a left etc*. Fast forward to 2018, we now have an app that tell us not how to get to our destination but advices on how long it will take get there, how much traffic is on that route, and actually advises us to take a different, shorter, faster, less traffic-congested routes.

Online Learning

- **Online Learning:** learning without walls, have disrupted the "normal" face-to-face learning, thus taking the so-called authority from the teachers / lecturer in our higher education.
- Online education technology has for the past few years, changed how higher education operates, educate and innovate. Through Massive Open Online Course (MOOC), higher education has not been able totally live up to the hiped expectations, online learning innovation have made higher education accessible to a larger populace, made online certificates more acceptable, have opened up new opportunities for students and hanged many peoples value for education.
- Online education has also made it possible for universities to reach non-traditional students such as people with fulltime employment whose work schedule had made higher education inaccessible. Though some feel online education lacks human interaction, innovations in pedagogies, strategies and technological techniques like **Video Conferencing** have made OL more interactive, personal and more engaging thus breaking the impersonal barriers

Internet of Things (IoT):

- IoT coined by Ashton 2009 refers to a series of unique but identifiable objects and their virtual representations in internet like structure. Basically, it is the interconnection of all objects and devices or machines readable using low cost sensors.
  - IoT has altered realities by providing advancement in online learning thereby changing the ways universities operate from ways of reaching prospective students, screening, admitting, engaging the students body and how resources are provided and even made available to students.
  - The Internet of Things has opened up new possibilities in higher education as increased connectivity between devices and "everyday things" means better data tracking and analytics, and improved communication between student, professor, and institution, often without ever saying a word.
  - IoT will make it easier for students to learn when, how, and where they want to be, while providing teachers support to create a more flexible and connected learning environment.
  - With IoT technologies, predictive analytics can provide additional insight into how students are doing both in the classroom and on campus.
  - With the right infrastructure in place, universities will be able to respond to early indicators of an "at-risk" student at the critical moment before that student's performance begins to suffer.
- The potential that IoT offers Higher Ed is seemingly only restricted by the creativity of those implementing it.

Virtual Reality (VR)

- **Virtual Reality (VR):** VR is about gaming and entertainment and more popular in that industry. But in education, it combines the best of in-person and online education in an immersive experience. For now, the penetration of these tools in Higher Education is still low. Even in the US, the birth ground of these technologies, few classrooms have VR tools.
- But this will soon change. Some forward-thinking universities are already experimenting with this technology.

Virtual/Augmented Reality

- **Virtual and Augmented Reality** technologies is poised to take Higher Education to the realm of what used to only exist in science fiction. With access to augmented or virtual reality technology, students can immerse themselves in real-life learning situations that are either too dangerous or not possible to experience otherwise.
  - For example, imagine a medical student is now able to perform complex procedures in virtual reality without putting themselves or their virtual patient at risk. With virtual reality the student is able to practice without causing harm such that by the time they perform on real humans they have become experts thus reducing death rates of surgery patients.
- These reality altered technologies are useful pedagogical tools but they require significant planning and investment into the infrastructure needed to support them. But as the technologies gets more efficient and less expensive, augmented experiences will become an expected (if not required) piece of tool in higher education.

Artificial Intelligence (AI)

- Artificial intelligence may not be taking Higher Education by storm, its potential for disruption is evident in its rise in mainstream popularity. IBM's Watson captivated Jeopardy audiences when it was able to compete against human contestants.
  - Intelligent personal assistants like **Siri** and **Cortana** show how useful A.I. can be in day-to-day activities. Imagine having an A.I. professor's assistant or an online learning platform that adapts to each student's specific needs.
  - Having artificial intelligence that learns and improves as it aids in the learning process could have a far-reaching effect on higher education both in an online and in-person learning environment.
- While Higher Ed may not be as prone to disruption as other industries, there are certain technologies that have undeniably disrupted how students learn, professors teach, and how universities operate.
- Despite the fact that these disruptions often represent significant challenges for universities to keep up with, they are ultimately beneficial for higher education as a whole.

Collaboration Platforms

- Videos, presentations and forums integrate education materials from different sources in different formats thereby fueling collaboration among Higher Educational institutions. This makes learning easier, less restrictive, and social.
- Education and innovation consortium NMC's 2015 Higher Education shows a growing number of universities forging collaborative strategic alliances
- This is done by forming local and international strategic alliances and consortia. But these partnerships have to be relevant and beneficial for all participants
  - **Prof. Longe Mentoring Grp on Whatsapp,** not just social.
  - **Open Cloud Consortium (OCC)** as a successful example of this. This entity enables professors and researchers to share vast amounts of data.
- This enables departments at the university to be in constant consultation
- Despite the challenges, collaboration is key for benefitting students trough innovation and internet is the great facilitator of collaboration in Higher Education because it eliminates geographic boundaries hindering local and international collaboration between students and teachers.

Competency Based Education (CBE)

- This is a process that recognizes that all students are not equal in terms of skills, intelligence, and proficiency level
- Thus learning is designed to move at the rates of individual students cognitive abilities
  - This is basically "Individualized instruction".
  - Technology now exist that can better measure the different levels of students and design adaptive learning programs to suit them
- The aim of CBE is to engage students starting from where they are then expand their knowledge by going from familiar to abstract
- CBE is self-paced, individual-focused and makes learning more efficient, effective and productive.
- CBE moves students away from the traditional way of learning and teaching style to a NO CHILD LEFT BEHIND model.

How does this concerns us in Nigerian education?

- A situation where a carryover student is advised on what to do next based on predetermined alternatives or a carryover student is forced to register all the courses before new level courses can be added, or better yet, a 200 level students is encouraged by been told he/she is a potential first-class student. This is done by algorithms that permutate ones next move and options.
- A perfect situation is where my son who was in 200 level (sophomore in the university) was advised to change his course from Computer Engineering to either Information Systems or Marketing based on the courses he was failing and passing. The system actually forced him to see his academic adviser before he could register into 300 level. Virtual Academic Advising (VAA) reducing academic adviser's stress and long lines of students waiting to be advised at the beginning of a new academic session.

How does this concerns us in Nigerian education?

- Simple technology implementations like:
- Online fee payments: proper accountability, budgetary planning, and less financial leakage for higher education
- Automated academic processes:
  - CBT technology: faster turnarounds in grading, less work for lecturers, less intimidation of students
  - Online Result Computation: less susceptible to human manipulations
  - Faster transcript preparation
  - Open Education Resource (OER) systems: increases research database, encourages collaboration, creates fro richer engagement of students
  - Plagiarism Checker: Academic integrity
- **NOT TOTALLY LIKED BY MANY (attracts more enemies but it is for greater good)**
- Online Distance learning: New NUC initiatives with AVCNU in collaboration with London Online Education
  - This initiatives allows all universities to participate in online learning
  - Reduces current admission crises in Nigeria

11 Disruptive Technologies for Higher Education

- **Personalized Learning experience:** Pace modalities to students needs
- **Distributive Cognition (dCog):** This is based on Edwin Hitchins theory of distributive cognition. It is a situation where environment and educational tools are used as a single cognitive system. Educators can use this to create digitally enhanced interactive experience for our students.
- **Visual Learning: seeing is believing** can be integrate into learning using computer modeling to create a more visual situation for our students

Leveraging disruptive continues ....

- **Complements traditional classroom learning:** today's generation is more technology intuitive one, teachers should create a leverage between text books, personal development, and interpersonal skills
- **Shortens student feedback:** constant interactivity reduces speed of feedback thus motivating students learning. Schools can develop software that can provide personalized feedback to students
- **Encourage research-based learning:** provides opportunity for exploratory process instead of memorizing
- **Webinars:** free online seminars on practically every subject allows students to interact in real time discussion session thus accelerating learning

Leveraging disruptive continues ....

- Encouraging more CBT and Automated test scoring
- Increase access to educational resources thus creating the global students mentioned in our National policy on ICT in education
- **Automated energy maintenance:** self adaptive energy saving platform which in turn could create sustainable, cost saving opportunity, and may lead to lower tuition, improved infrastructure, and even lead to provision of scholarships to students
- **Collaborative Research:** Encourages more collaborative research activities in Higher education

Conclusion

- Despite Higher Education's reputation for being slow to adapt, it is undeniable how disruptive certain technologies have been in recent years. The Internet of Things (IoT) for instance, augmented reality and advancements in online learning have changed the way universities reach prospective students, engage with their current student body, and provide them the resources they need.
- For Nigerian higher institutions, the advent of Treasury Single Accounting (TSA) and the use of **Remita** for fee collection has forced most schools to go to online for fee collection. Though disruptive, these processes have made accounting, bursary, and auditing services much easier and more transparent.

- According Leigh and Goldrick, “there are certain “growing pains” that forward-thinking universities must endure to stay on the leading edge of Higher Educational technology. It’s up to IT leaders within these institutions to explore the pros and cons of integrating new technologies, so that they may guide decision-making processes before external elements force their hands.”
- This is true especially in Nigerian Higher Education. We better not wait for NUC, NCC, NITDA or even JAMB to force our hands and push technology down our throats.
- Instead, lets go ahead and disrupt

THANK YOU!

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