

# INVESTIGATING MASSIVE OPEN ONLINE COURSES (MOOCS) OPPORTUNITIES FOR DEVELOPING COUNTRIES: CASE OF PAPUA NEW GUINEA

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## Abstract

*The proliferation of massive open online courses or MOOCs has proven disruptive to the traditional educational enterprise. While there is an on going debate about the future of MOOCs, it has already shown effective results for particular cohort of learners. This research investigates the adoption of MOOCs as a disruptive initiative in developing countries, and in particular in Papua New Guinea (PNG). The results from conducting in-depth interviews with PNG MOOC users and Australian based academics have been conducted. Findings suggest a framework with four dimensions: Intentional and Non-Intentional attributes distributed from a Systematic (disruptive) to Non-Systematic (non-disruptive) spectrum. Based on such finding, recommendations include generating awareness of MOOCs to educational institutions, investment in feasibility studies and engaging in established Australian institutions for long term partnership in MOOC development and deployment.*

*Keywords: Massive Open Online Courses, Papua New Guinea, disruptive educational technologies.*

# 1 INTRODUCTION

Online learning, which offers flexibility around the user of the service (Abedin et al. 2011), gained more attraction with the continuously rapid changes in technology; more recently cloud computing. Cloud computing has made it possible for open online models such as massive open online courses (MOOC) (Fasihuddin et al. 2014). The emergence of MOOCs therefore, in the educational enterprise, subsequently impact existing university models.

According to one of its earliest publications, a massive open online course (MOOC) is an “online course with the option of free and open registration, a public curriculum and open-ended outcomes” (McAulay et al. 2010). These courses are created around curated, open collection of subject specific resources. There are two distinct branches of MOOCs: 1) the connectivist MOOCs (cMOOCs) which derives itself from connectivism that centers on pedagogy or learning methodology and 2) the more formal MOOCs (xMOOCs) which is more popular of the two and is more focused on information transmission. Coursea, Khan Academy, Udemy etc. are examples of xMOOCs. This paper will focus on xMOOCs (referred to simply as MOOCs) unless stated otherwise.

There are numerous papers published on MOOCs and their usefulness (or detriment) to the educational enterprise. One initial pedagogical aspect not in favor of MOOCs is that observed learning analytics and its practices presupposes a formal education context (McAulay et al. 2010). Hence, it is hard to utilize in a MOOC environment. Even until recently, Catholic education in the US, one of the US most prominent sectors boasting 250 colleges and universities has not embraced the MOOCs hype totally. The reason being, they understand education to be a ‘moral enterprise’ that develops human dignity and promote social justice (Malesic 2013). Brand recognition among educational institutes and providers is certainly enhanced by MOOCs offering but it is more of an issue in certain sectors and must be considered alongside showcase of faculty innovation and recruitment from a greater pool of students.

Online learning models, like MOOCs are impacted by cultural psychology (Clarà 2013). As the evolution of MOOCs delivered by world-leading universities are driven by a common institutional strategy to harness digital technology and on-campus teaching, much of the science of teaching or pedagogy will continue to be based on behaviorist psychology. The common attributes in such assumptions are that 1) knowledge resides in the individual; and 2) knowledge is a thing or representation. As culture plays a determining factor then in the adoption of MOOCs, current practices such as collaboration may be situational. Their application to culturally rich, developing countries is a challenge that warrants research into. In a 2012 technology outlook publication on Australian tertiary education, MOOCs were shortlisted as one of the most imminent technology in the enterprise, which had a time-to-adoption period by 2017. MOOCs are a response to the challenge of a sudden acceleration of high global education demand (Johnson et al. 2012). As such, all-online learning

models may be needed to meet this need and MOOCs may not be seen as a threat but an opportunity to meet the underserved markets.

This research paper is focused on understanding the disruptive phenomena of MOOCs, its implications and specific application to the universities in developing countries with limited access to world class education, and in particular Papua New Guinea (PNG). In keeping with technological advances, particularly those disruptive in nature, the challenge in the education enterprise is the transition to digitally native pedagogies and learning approaches in such least developing countries, where learning methods are elementary and technology penetration is very low (Johnson, Adams & Cummins 2012). Specifically, this paper aims to answer the research question: how MOOCs have been adopted or received in PNG. The secondary research objective is to investigate the opportunities of MOOCs for PNG students and universities.

## **2. BACKGROUND**

In order to fulfil the primary research objective, we conduct a review of existing literature on the current absorption or diffusion of main disruptive technologies in PNG's primary, service industries and educational sector in comparison to other developing countries over its recent history. A framework is then developed that would guide our efforts in investigating the opportunities MOOCs offer.

### **2.1 The State of Internet Technologies Adoption in PNG**

While there has been a lot of attention to the technical sides of online learning platforms, the human side of (Abedin et al. 2014), and especially for users in developing countries, still needs further investigation. Technology adoption leading to innovation in developing countries are, by nature problematic, characterized by poor business and governance conditions, low education levels and mediocre infrastructure (Aubert 2005). The developing world presents more complicated challenges due to diverse situation in terms of development, culture etc. Most decisions in developing countries for appropriate technology advances are inclined towards cost basis and range availability (Stewart 1977). There is an observed shift in which intrinsic value should outweigh cost and risk when considering technology driven projects. Hence, new technology decisions have been towards developed country technologies.

As a developing country, PNG shares similar challenges of being technically and financially dependent on developed countries, especially Australia. Australia, being the largest donor to PNG's economy, states that PNG lacks the capacity to counter poverty (DFAT 2013). As PNG has been adopting much of its technology from Australia, a representation of Australia's Commonwealth

Scientific and Industrial Research Organization (CSIRO) time map evolution of disruptive technology is ample guide to estimate the rising disruptive phenomena (CSIRO 2013).

## **2.2 Massive Open Online Courses (MOOCs)**

Online distance learning has often been used for studies where learning occurs through computer-mediated collaboration and interactions between people (Abedin et al. 2010). While online distance learning environments have been around for many years, they have experienced various changes and adoption styles for various purposes. Massive open online courses (MOOC) are probably the most recent form of online distance learning, which have been established to offer open, flexible form of online education, which allow almost anyone to enrol and learn (Ayala et al. 2014). Some of the world's most prestigious universities such as Harvard, MIT and Stanford are forerunners in MOOCs while others are by private organizations like the Khan Academy. Coursera, for instance has been cited to partner with about 100 universities from 40 countries and boasted over 17,000,000 enrolments from over 190 countries (Fasihuddin et al. 2014). Based on such prolific statistics, it still remains to be determined whether MOOCs, like Coursera can be viewed as a success.

Although there were initial high levels of enrolments, there were considerably lower completion rates worldwide when compared to 'conventional' education (Clow 2013). In the UK alone, conventional courses have 90% completion in highly selective high-status universities and 60% in universities with more social focus. Online and distance universities, fall in between MOOCs and conventional, having completion rates of 31-61%. The extremely low MOOC completion rate is a phenomenon that deserves further investigation. Clow (2013) terms this level of dropouts in MOOCs as 'funnel of participation' phenomena. Deriving the theory from the marketing funnel, it directly parallels the generalized stages in which a customer journeys from the Awareness, Interest, Desire and Action. A significant level of attrition was evident in the numbers through the stages when compared to the formal, conventional education. Regular assessment of students' participation and contribution during the course showed a highly unequal rate of 2.4-3.7% across the various platforms. Although the funnel of participation does not presuppose a fixed outcome but anticipates rather an open-ended shared form of participation through the various stages, backed by empirical data. Ayala et al. (2014) argue that while MOOCs are beneficial and attractive for some cohorts of learners, they are not suitable for everyone. MOOCs provide values for learners when the content of the courses are well appreciated and received by learners, and factors such as content and learning style should be taken into consideration for MOOCs adoption as these factors significantly impact MOOC learners' satisfaction.

## **2.3 Grounded Theory model**

Grounded theory is the discovery of theory from data (Glaser & Strauss 2012). It has then become a method of deductive analysis in qualitative research as pointed that the established quantitative

methods where not granularly applicable to sociological issues. We follow the idea in the analysis of the interview data that grounded theory will be used as generalized theory of comparative analysis.

The use of grounded theory, as positioned by the founding authors, is that a theory or framing of the research finding suits its supposed purpose and not serendipitous or from a priori assumptions. Although grounded theory is often labeled as a qualitative approach, it can be both qualitative and quantitative methods (McGhee et al. 2007) and seeks to generate theory from the research situation in the field as it is.

Due to its popular use, there has arisen many and varied versions of grounded theory. Hence, it is worthwhile summarizing the three main versions (after Glaser and Strauss parted ways):

- Glaser: theory should emerge by constant comparison and not forced. It is the purist end of the spectrum of grounded theory
- Straus and Corbin: ideas and models are prescriptive, developing categories in context and strategies. Due to the structured approach, it has gain popularity
- Charmaz: categories and theories constructed by researcher. The focus is on constructing a social reality of the world, regardless of what is in it, enabling the thought that how the researcher interprets the data is just as important as how respondents do.

The views held by Glaser (McGhee et al. 2007) disagreeing that the researcher must not consult professional literature under the field of study until codes and categories have emerged, and the more modernist constructivist view held by Charmaz, were not followed in the data analysis. The study of MOOCs and their application in developing countries leans more towards the more structured approach proposed by Straus and Corbin due to 1) inability to set aside theory from the start as theory neutral observation is impossible 2) the first objective proposes a model, which specifies a theory bid 3) theoretical sampling takes time and the course of study was limited and 4) the coding used in the analysis broke up the descriptive, narrative flow of data.

### **3. DATA COLLECTION**

As this is an exploratory study, and also as to our knowledge no prior academic research has been done in this topic in PNG, in-depth interview method was used to explore how MOOCs have been adopted or received in PNG. Since Internet MOOCs users in PNG are rare, two rounds of interviews were conducted with MOOCs researchers and/or instructors as well as actual MOOCs learners. Firstly, a search was conducted to find PNG citizens with experience with MOOCs, who have either enrolled in a MOOC or have completed it. Secondly, interviews were conducted with MOOCs instructors or scholars to obtain their views on benefits and impacts of MOOCs on PNG. At the time of conducting this study, no PNG instructor was directly involved with a MOOC. Thus, since historically PNG's higher education system has been influenced by the Australian system, we interviewed Australian

MOOCs instructors and/or scholars with a good knowledge of PNG higher education systems. Table 1 shows information about research participants.

*Mode of Data Collection:* the preferred data collection mode was in-depth interview with a small number of individuals to explore their perspectives on the disruptive phenomena of MOOCs and the opportunities it provides. These in-depth interviews were essential in exploring new issues in depth and providing context to current literature, offering a more complete picture surrounding the proliferation of MOOCs (Boyce & Neale 2006). The methodology endeavored as much as possible to adhere to this ideal.

<b>Interviewees</b>	<b>No. of participants</b>	<b>Background</b>
PNG MOOCs users	10	Learners had a good English skills, with a degree in computer science, and an average of 1.5 years of work experience
Australian MOOCs scholars	5	Scholars who either have coordinated a MOOC or have research experience in e-learning and/or MOOCs

*Table 1: Interviewees background information*

A summary of a qualitative research methodology implementation were as follows:

- Interview Protocol was developed with questions and procedures
- Questions directed covered aspects of disruption, MOOC development, stakeholder involvement, ‘traditional’ university value, cultural considerations, drivers and opportunities
- Face to face interviews was the preferred mode of data collection. However, due to limited availability of respondents, phone interviews and one case of email response eventuated.
- An open invitation was extended on Facebook to members of the PNG computer science community, who had enrolled and experience in MOOCs, to participate in the survey. Response was very limited, prompting further investigation out of the course of this current research.

Hence, a separate protocol interview for educational academics with minimal modification to suit research areas was used to that of the PNG MOOC students.

## **4. DATA ANALYSIS**

### **4.1 Analysis of Codes**

Since a separate emphasis in interview protocol from academics and PNG MOOC users generated distinctly separate codes, the former group was elected as guide and insights from latter were combined for theoretical coding towards the end of the analysis phase.

Two major categories of current MOOC attributes emerged from the data analysis: 1) *systemic* or disruptive and 2) *intentional* or focused. Systemic categories imply that the attributes are inter-related and belong to the overall system so a disruption in Internet cloud offering, for instance, has a direct impact on how long it would take to deploy a MOOC as the previous complexities have been

removed. University reputation and life-long learning are examples of non-systemic attributes which are not as dependent on disruption as most others.

The intentional category of attributes addresses the broader reasoning behind developing MOOC: the purpose of the MOOC, the intended audience, the goals or aims in attending a particular MOOC etc. Most MOOCs were created in response to the hype, however whether they serve the greater objective in an integrated manner has been discovered to be major consideration.

	<b>Intentional (Focused)</b>	<b>Non-intentional (Not-focused)</b>
<b>Systemic (Disruptive)</b>	3 – 5 years period Quality, free information Transferable skills Pathway creation Industry relations Curriculum design Cost and Quality costs	Cultural assistance in forums Period of ‘disillusionment’ Available technology Technology literacy
<b>Non-systemic (Non-Disruptive)</b>	Current University business models University reputation Wider audience Life long learning Content ownership Rigor and analytic lacking ‘Oily rag’ implementation	Generic creation steps Social threats Trust between stakeholders Current accreditation lacking Lacks secondary support Concept acquisition

Table 2: *Categorizing of current MOOC Attributes Codes into quadrants*

#### 4.2 Theoretical Codes

Attributes that fall in the Systemic/Intentional quadrants of the cross section hold for mature MOOC environments in developed countries, such as Australia where the research was conducted. There is an estimated 3-5 year period of maturing needed before the impact of MOOCs in terms of providing, high quality information, transferrable skills and costs savings is realized. Developing countries, with inherent concept acquisition pedagogy, cultural assistance requirements, low technology literacy and even lower digital penetration, are more spread in the other categories where intention is not focused, technology disruption has very little impact on daily operations.

### 5. DISCUSSIONS & RECOMMENDATIONS

The opportunities for MOOCs in PNG is elaborated, based on the Table 2 categorization. Two main categories that encompass the attributes discovered in the data analysis pertain to the *systemic* disruption of MOOCs and *intended* outcome of a particular MOOC. Not all attributes are systemic. Life long learning is part of all forms of education, even in primitive PNG, however current lack of rigor and analytic in MOOC offering does not advanced learning experience in developing countries.

Since this form of learning is inherent, deploying MOOC does not add value until it matures in the next 3 to 5 years. The common maturity time span of 3 to 5 years could be due to institutions or organizations inherent technology maturity cycle of services and products or its medium term IT strategy period based on the conclusion of its investigation phases. For universities in particular, the time between submission of budget and grant till implementation may be 3 to 5 years. However, as highlighted earlier, the disruption in online learning, including MOOCs is part of the larger disruption the PNG economy due to the PNG LNG which is in production stages (ExxonMobil 2014). A notable challenge is resourcing a knowledgeable workforce to meet the demand of the mineral boom.

Such is a *Systemic/Intentional* combination, where knowledge transfer for citizens can be made possible through MOOCs, in agreement between the university and the industry partner i.e. ExxonMobil. Industry partnership is a key attribute in MOOC development. Current universities in PNG lack the resources to adequately meet the demand by the industry, for ongoing professional development and nationwide skilled workforce. The current adaptability of MOOC to meet demand, in masses, regardless of location should strategically position universities to re-model their operating business and be of relevance to the industry.

## 6. CONCLUSION

This paper aimed to investigate and model the adoption of disruptive technologies in developing countries, namely Papua New Guinea (PNG). A three-dimensional framework for developing countries should contain the added dimension of impact feedback (IFB). Hence, a technology is generally adopted in such setting having high PEOU, high PU and high IFB. The results from conducting in-depth interviews with PNG MOOC users and Australian based academics supports the framework, further specifying systemic and intentional attributes, aligned to the IFB component of the proposed model. Based on such finding, recommendations include generating awareness of MOOCs to educational institutions, investment in feasibility studies and engaging in established Australian institutions for long term partnership in MOOC development and deployment.

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