International **R**eview of **R**esearch in **O**pen and **D**istributed **L**earning
Volume 20, Number 5

December – 2019

Frugal MOOCs: An Adaptable Contextualized Approach to MOOC Designs for Refugees

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Abstract

There is a growing body of literature that recognizes the role Massive Open Online Courses (MOOCs) can play in improving access to education globally, and particularly to thousands of people in developing and developed countries. There is increasing concern, however, that the millions of displaced refugee learners throughout Europe, the Middle East, and other regions are still disadvantaged when it comes to engaging in learning through MOOCs. The reasons for this disadvantage range from a lack of appropriate infrastructure or other supporting structures, to a lack of contextualized content. So far, little attention has been paid to contextualized MOOC models, which may both impact policies and be adapted to the specific needs of these learners who often do not have the means to access many education opportunities. Therefore, the purpose of this paper is to propose a frugally-engineered MOOC model that addresses the barriers of access and participation for refugees. This paper engages in an exploratory research methodology, using findings from the literature and expert opinions gathered through interviews. These findings lead to the development of what the authors call a *Frugal MOOC Model* which can be contextualized to meet the needs of refugee learners. The paper goes on to highlight the development of the Frugal MOOC Model as the first phase of an ongoing study. It concludes with recommendations for the next phase of the study: how to implement the newly developed model.

Keyword: MOOCs, Frugal MOOCs, frugal innovations, human rights, contextualized education, sustainability, cross-cultural designs, open educational resources, implementation

Introduction

The world today is facing the largest number of refugees and forcibly displaced people in history: 70.8 million and growing (United Nations High Commission for Refugees [UNHCR], 2019). Millions of these people are displaced in unfamiliar locations, often with limited access to and means to satisfy basic needs. One of these basic needs is access to education (United Nations High Commission for Refugees [UNHCR], 2016b). As the need for skilled and educated employees to support economic growth continues to rise, this education crisis will only get bigger. In the years to come, it will have significant repercussions on the global economy (Calonge & Shah, 2016). In response to this humanitarian situation, the European Commission (2016) report emphasized that a core priority for Europe is the promotion of and, thus, access to education, particularly in urgent and fragile contexts.

Refugees struggle to get access to high quality, affordable, and relevant educational content (Moser-Mercer, 2014), and this often leads to inferior educational outcomes or disengagement. More than half of all refugees globally are school-aged children and only 50% of these refugees are enrolled in primary schools. In 2016, for instance, only 30% of over 252,000 school-age Syrian refugees were enrolled at school. Among the 2.5 million refugee adolescents of secondary-school age globally, nearly 2 million did not have an opportunity to attend secondary school in 2015 (UNHCR, 2016b). It is estimated that 1 percent of refugees have access to higher education (UNHCR, 2016b). According to Lorisika, Cremonini, and Safar Jalani (2015), more than 100,000 refugees missed university classes in 2015 while residing in Lebanon, Jordan, and Turkey. There is also evidence that many in those communities, even those in urban contexts, face serious isolation because they lack opportunities to access relevant adult education, high speed internet, and professional/skills training. The lack of educational and professional development opportunities are often recognized causes of poverty. The development of contextualized and transferable knowledge using affordable learning tools is, therefore, key. Contextualized technology can provide ways to deliver distance curriculum as well as professional learning. A United Nations Committee on Economic, Social and Cultural Rights (UNCESCR) identified four critical features for education as a human right: education must be “available, accessible, acceptable and adaptable” (UNCESCR, 1999). Research has indicated that Massive Open Online Courses (MOOCs) have made access to content possible to hundreds of thousands of students in several nations (Rodriguez, 2012). However, the majority of these students already have a degree, have not been subjected to dramatic conditions of displacement, and do not live in camps that, in many instances, lack quality education opportunities (Palin, 2014). Due to the growing diversity in the types of students, both socioculturally and geographically, “simplification” and the development of “new distributed models” (Basu, Banerjee, & Sweeny, 2013), as well as other core components that are inherent to what characterizes *frugal innovations*, may be part of the solution. This could help to counterbalance the lack of existing opportunities for refugees.

Basu et al. (2013) defined frugal innovations as “appropriate, adaptable, affordable and accessible” (Basu, et al., 2013). Frugal innovations often originate in resource-poor contexts where people have to leverage resources in new and more affordable ways—in short “do more with less” (Radjou & Prabhu, 2014). Considering these factors along with the necessity to contextualize and therefore to facilitate “MOOCs without borders” for the inclusion of refugee populations and upholding the basic human right of education for all and thus, adapting from a “Contextualised MOOCs Model” (Shah, 2020), we believe there is a critical requirement for the development of what has so far been neglected: a *Frugal MOOC Model*. Considering the features for education as a human right (as defined above), the concept of frugal innovations and adaptability to the contexts of displaced learners, the aim of this paper is to investigate

and present a new, adaptable, and contextualized MOOC design, which may help tackle the needs of refugee learners in fragile contexts. In other words, this paper will examine the following research question:

> What are the elements required to design a contextualized Frugal MOOC Model for learners who are displaced?

The authors propose a Frugal MOOC Model which can be implemented in the contexts of the increasing groups of refugee learners throughout many parts of Europe, Australasia, and the Middle East. This model may subsequently play a role when examining the global need to provide contextualized education for the larger percentage of learners who are in rural areas or live in conditions of poverty and do not readily have access to educational opportunities.

As this research deals with a new concept (a Frugal MOOC Model) and is both in its early stages and exploratory in nature, the above research question will be preliminarily answered through the findings in the literature and expert opinion. For the purpose of this study, a frugally-engineered MOOC model is defined as a significantly pedagogically-rethought/needs-based design adapted to the needs of displaced populations with a specific focus on refugees.

Background Literature

Frugal Innovations

Frugality is a concept that has been in existence for centuries. It was originally associated with issues pertaining to finance and, on a larger social scale, it is seen as a means to counteract the consuming and unsustainable effects of environmental conditions (Johnson, 1978; Talwar, 2003; Fujii, 2006). In more recent years, frugality has evolved to reflect calls for sustainability in an era of globalization and the ubiquitous use of low-cost technology. The perception of "frugality" has therefore developed into the concept of frugal innovations. The need for sustainability and the socioeconomic contexts of under privileged populations and emerging markets are the core drivers of frugal innovations. The principles of frugal innovations are defined by what Basu et al. (2013) have called the "10 Core Competencies for Frugal Innovations" which further categorize the required design process for its implementation. These 10 core competencies are as follows:

- *Ruggedization* – This refers to developing frugal solutions that are designed for and can withstand conditions of "extreme environments," which in some cases may be due to remote locations.

- *Lightweight* – This refers to portability. A frugal innovation should be transportable and thus able to benefit "large groups of people" in various locations.

- *Mobile-Enabled Solutions* – The purpose of this competency is to use disruptive technology platforms, such as mobile phones, to enable greater "connectivity" while providing effective solutions.

- *Human-Centric Design* – All innovative frugal designs need to focus on the user. Ease of use and intuitive designs are essential for sustainability and must therefore require "little or no prior knowledge or training to utilize."

- *Simplification* – This competency emphasizes minimalism. The innovation must have "minimalist features and functional requirements," which can lead to higher usability and acceptability.

- *New Distribution Models* – This refers to providing frugal innovations to large populations using "non-conventional channels." The use of these channels widens the access of the product or service.

- *Adaptation* – Adaptability is a key competency. Here it is required for "leveraging existing products, inputs and services."

- *Use of Local Resources* – This reinforces the sustainability impact of frugal innovations. The use of local resources refers to "sourcing without importing equipment or materials."

- *Green Technologies* – This competency examines environmental conditions and concerns as it develops innovative frugal solutions which are "powered by renewable resources."

- *Affordability* – This final competency incorporates the financial aspect of the frugal innovation for both its users and providers. Therefore, affordability is comprised of "low input and operations costs."

MOOCs as Frugal Innovations and Education as a Human Right

The rising population in nations such as India and China and the influx of displaced learners throughout Europe, Turkey, and Canada—consequences of the Syrian conflict and ongoing crises in various parts of Africa and the Middle East—are said to be generating an "unprecedented transformation" in education systems (Pathak, Pandey, & Vashisht, 2016). 50% of the population of India, for instance, is currently under the age of 25, and many of these people are in need of education, are living in rural and remote communities, and are under the poverty bracket (Shah, Wagner, & Oztok, 2015; Pathak et al., 2016). Similar instances requiring greater access to affordable education at all levels are occurring in several other nations (Lewin & Caillods, 2001; Pityana, 2009), such as South Africa or Bangladesh. This phenomenon is only exacerbated by push factors such as the ever-increasing pace of globalization, the influx of displaced learners from war-torn areas, and the gradual increase of rural/urban migrations. As Mendenhall, Russel, and Buckner (2017) note, "more than half of the world's refugee population now live [sic.] in urban areas." This has brought about greater competitiveness for jobs and, consequently, soaring demands for improved affordable, accessible, and quality education. Pathak et al. (2016) discuss these effects when they suggest increased trade and global economic investments, as well as the necessity to work across borders, are forcing nations to reexamine their education systems in order to adapt to "changed global realities." They went on to propose the possibility of a reciprocal relationship between economic drive and affordable academic needs. This focus on adaptability and on the reexamination of education due to the displacement of learners and the greater global competition for employment highlights again the critical features of education as a human right. These features, together with cost-effective and accessible education, bring the need for frugal innovations for education into the MOOCs sphere.

The original rhetoric surrounding MOOCs was that they were producing affordable access for "whoever is interested in learning" (Yuan, Powell, & Cetis, 2013). This principle of flexibility, of being "open to all" types of learners at low cost (Yuan et al., 2013), should be the appropriate answer to providing education to displaced learners. Lane, Caird and Weller (2014) argue that open source materials could provide a potential solution when they state that "in essence open educational systems offer the potential to break the iron triangle of access, cost and quality that apply to education and create more flexible forms of provision alongside the existing more traditional but rigid forms."

However, despite their initial premise, a number of studies have shown that MOOCs were, in fact, reproducing and often aggravating existing inequalities (Kop, 2011; Palin, 2014). MOOCs have been largely designed to cater towards "knowledgeable" learners who have sufficient financial resources to afford education and, therefore, are not necessarily engaging in MOOCs as a means of gaining a livelihood and becoming employable (Palin, 2014). In many cases, MOOCs further widen existing educational divides as the education world is increasingly being separated into tiers: those who easily have access to MOOCs due to their high level of privilege in society (Perris, 2014), and those who need access to MOOCs because they are "left out" of the higher education system (Ernst & Young LLP, 2013).

As it appears that the demand for education continues to outpace its supply in growing populations, understanding education as a human right and combining the principles of frugal innovations with those of MOOCs may be effective ways to tackle the this problem. Studies have suggested this could have a knock-on effect on the dire socioeconomic conditions faced by nations dealing with displaced and rural populations, as education and frugal innovations "often offer a social benefit" (Lehner & Gausemeier, 2016). A similar sentiment is found in Pansera and Sarkar (2016), who suggest that this may aid in "poverty reduction" as well as promote inclusion for those otherwise left out of education because of other unmet needs. A study by Sen Gupta and Parekh (2009) implied that this could be a successful "universal strategy" for both "global economic viability" and the "all round development" of numerous nations.

Elements of Contextualization for a Frugal MOOC

The "critical challenge" of globalization is to gain sustainability and contextualization in several areas including education. This is crucial, particularly when nations such as the United States try to establish "internationalization strategies" for product or service deployment in nations that are dealing with different socioeconomic challenges and with "underdeveloped or absent" infrastructure (Khanna, Palepu, & Sinha, 2005). Without examining local contexts, "institutional voids" are particularly a problem for displaced learners and those in emerging markets. This creates the need to identify innovative frugal options that are useable by their local populations (Khanna et al., 2005). This context-savvy approach enables "resource-constrained" nations to allow their populations to engage with MOOCs (a product and also a service) that can help build stronger, knowledge-based societies (Zeschky, Widenmayer, & Gassmann, 2011).

In examining contextualization along with education as a human right and Frugal MOOCs, the literature identifies four key elements: *content customization*, *local stakeholders*, *technological infrastructure and green mobile-enabled technologies*, and *learners' needs*.

Content customization. Numerous studies, including those by Kop (2011), Gunawardena (2014), Palin (2014), and Knorringa, Pesa, Leliveld, and Van Beers (2016), have highlighted the overall

need for content customization in MOOCs in order to make them adaptable to and repurposable for learners' contexts. This involves incorporating content in the local official and vernacular languages used by learners, as well as providing relevant course materials by adapting the content to the participants' contexts (Gunawardena, 2014; UNHCR, 2016b).

Local stakeholders. Studies by Winkler (2014) and Jain, Gopalakrishnan, Mehra, Kennegal, Upadhyay, Pankaj, and Baxi (2014) have also indicated that local stakeholders need to be consulted on multiple occasions to ensure that their input regarding local circumstances and needs underpins appropriate (and acceptable) educational designs. The educational challenges of diverse regions along with their socioeconomic contexts are likely to require different forms of collaboration with a variety of stakeholder groups who engage in the design and development of MOOCs (Winkler, 2014). Success, and therefore sustainability, may be partly dependent on local stakeholders including academic, government, and other local support institutions (Jain et al., 2014).

Technological infrastructure and green mobile-enabled technologies. When reflecting on the element of technological infrastructure and green mobile-enabled technologies, the literature has stressed providing education through technological tools that are available to the learners as well as examining the availability of factors such as bandwidth and download speeds (Ratwatte, 2013). Research has indicated, for instance, that in remote communities people have far fewer opportunities to "engage with online technologies due to a lack of quality telecommunication services and the high cost of mobile device access and the lack of sufficient access to computer equipment, private or public" (Anthony & Keating, 2013). Providing MOOCs with contextualized technological tools and infrastructure can help in "eliminating the barriers of geography and privilege" (Wells, 2013). For displaced and rural learners, contextualization requires the use of green, mobile-friendly resources (Tyson, 2016; UNHCR, 2016a).

Learners' needs. Finally, numerous studies have also stressed the importance of contextualizing learners' needs (Hood, Littlejohn, & Milligan, 2015; Guàrdia, Maina, & Sangrà, 2013). This requires identifying intended learning outcomes, achievements, and gaps for learners, and the contexts that may influence their learning, as is the case with displaced and rural learners (UNHCR, 2016b). Users' direct involvement in culturally and ethnographically informed design, implementation, and evaluation is therefore absolutely critical to ensure interest, accessibility, "buy-in," retention, and sustainability for frugally-engineered MOOC education (Tyson, 2016).

Methodology, Methods, and Limitations

The methodology of this study was qualitative and exploratory in nature. This was because the development of the Frugal MOOC Model was based on findings in the literature and on experts' opinions. The development of the model has therefore, been viewed as an initial phase of this study. The inability to implement the Frugal MOOC Model provided an additional reason to follow an exploratory methodology. The next phase of this study intends to further examine and execute a methodology that enables the implementation of the Frugal MOOC Model that has been developed here.

Participation of MOOC Experts and Data Collection

In examining the elements required to develop a contextualized Frugal MOOC Model, MOOC experts were identified as the most appropriate participants for this study (Suri, 2011). Six experts participated in this study. They all have academic backgrounds and have more than 20 years of experience in the field of education. They are also engaged with and have a global perspective on the development, design, and nature of MOOCs in various contexts. Two experts were based in the United States; two were in South Africa and were selected based on their expertise in working in challenging socioeconomic contexts; the last two had worked directly with refugees and were affiliated with refugee resource agencies, one in Turkey, and the other designing MOOCs for refugee contexts in Jordan. The experts were therefore selected on the basis of "purposive sampling" (Groenewald, 2004). As this study is in its initial phases of exploration, six experts were considered a reasonable number and purposive sampling a pragmatic method through which to collect and manage data (Forker & Mendez, 2001).

Data were primarily collected through face-to-face and Skype interviews. In total, six interviews were undertaken between August and October 2016: three face-to-face and three via Skype. Each lasted for approximately 50 minutes each. According to Patton (2002), there are no definite or standard rules for sample size in qualitative inquiry, and "what can be done with available time and resources" needs to be taken into consideration. Using a qualitative approach based on a preliminary search of the literature, the authors of this study designed a series of open-ended interview questions. Questions were constructed in order to elicit relevant answers that would effectively shed light on MOOCs in refugee contexts. Interview questions addressed the experts general views on MOOCs in difficult contexts, the challenges (infrastructural, contextual, financial, pedagogical) faced when designing online courses in refugee contexts, the limits of the current MOOC format, and the critical elements for MOOC design that would help address the barriers to access and participation among refugees populations.

Interviews used a guided/collaborative conversation format, often used in grounded theory methods. All identifying information was stripped. The analysis of each transcribed interview followed a process of data reduction, and the drawing of conclusions outlined by Miles and Huberman (1994). Interview transcripts were manually coded by the authors of this study. The relevance of information for coding was made based on: (1) the frequency of occurrence of the concept; (2) whether the information stood out; and (3) if experts explicitly made an emphasis that it was important. Thematic categories were derived from these indicators, by using a constant cross-comparison method (Merriam, 2009). Through a constant process of comparing codes, patterns were discovered. Four emergent themes were then established: (1) content customization; (2) local stakeholders; (3) technological infrastructure and green mobile-enabled technologies; and (4) learners' needs.

Limitations

Conducting research on refugee contexts presents a distinctive set of challenges. Firstly, there is very little literature on MOOCs in fragile educational environments with refugee learners. Secondly, in this study, refugees could not be directly accessed and interviewed. Thirdly, the study was limited by being unable to gain a larger number of expert opinions, which raises concerns about a lack of representation. Findings presented in this study are drawn primarily from the interviews with the six experts, which precludes any claims of generalizability. Hence, most conclusions that can be drawn from the present analysis are tempered by these limitations and pertain primarily to the development and need for the Frugal MOOC Model and less to the immediate application of the model.

Findings

Content Customization

This element examined whether content customization was relevant to the design of a Frugal MOOC in terms of its being adaptable to and contextualized according to the needs of its intended learners. The experts all agreed that this was a most necessary element as it differentiates casual learners from those who are in need of education due to extenuating geographic and socioeconomic circumstances. The experts confirmed that previous designs of MOOCs "did not, in their actual form and shape, cater to the different needs of different learners." The experts also confirmed that MOOC content should be remixable and adaptable; this includes "resources that are going to be used in other contexts" for other learners, as they are currently not "designed to be universal." The experts firmly agreed that MOOCs would only be transformative if they were "put in the context of improving student learning," which requires adaptability of the design.

Local Stakeholders

The significance of requiring and involving diverse local stakeholders in the development of a contextualized Frugal MOOC design was examined here. All experts agreed that in order for MOOCs to be truly adaptable to diverse learners taking into account socioeconomic needs and geographical backgrounds, the MOOC stakeholders' role and function needed to be "re-conceptualized" in order to better match the educational contexts of the learners. The experts identified that current "tensions" and "power struggles" between faculty and institutions, were hindering the frugality and relevance of MOOCs for diverse learners. Local representatives, faculty, institutions, businesses, and local governments "need to bring all that together" as resource-rich and contextual stakeholders, which would enable MOOC platforms and developers to rethink "what good education would look like at scale" in fragile contexts.

Technological Infrastructure and Green Mobile-Enabled Technologies

The development of technological infrastructure, such as the provision of useable bandwidth speeds for engaging in MOOCs as well as designing the MOOC to be useable with the prevalent type of green mobile-enabled technological tools available for displaced and rural learners, were examined here. All experts confirmed the need to identify the availability of technological infrastructure for diverse learners as well as the necessity that MOOCs be adaptable to the local types of technology used. "They have access to mobiles" and this can be a primary tool for learning; this was the key, overall view of all the experts.

Learners' Needs

The focus here was to examine the requirements of the users in displaced and rural areas. Thus, any gaps in their learning needs, along with languages concerns and the availability of resources for their learning was investigated. The experts here all agreed upon the necessity to examine these needs for an adaptable Frugal MOOC Model. The experts identified "the lack of resources" relevant for learners in diverse regions, which seems to be the weakest link in current MOOC models. They agreed that the design for MOOCs needs to take into account learners' contexts, languages, and other cultural needs, and "has to be demand driven." They argued that the "personalization of the learning experience to cater to the diverse needs of the student" is critical for the sustainability and adaptability of MOOCs, and for providing an acceptable delivery of education that is contextualized according to the needs of learners.

The Frugal MOOC Model

The examination of the unquenched need for education of newly displaced learners signals the need to implement and enable education as human right by integrating frugal innovations and contextualization into MOOC designs. Therefore, initiating a Frugal MOOC Model (shown in Figure 1) to tackle the unmet education needs of these learners is absolutely critical.

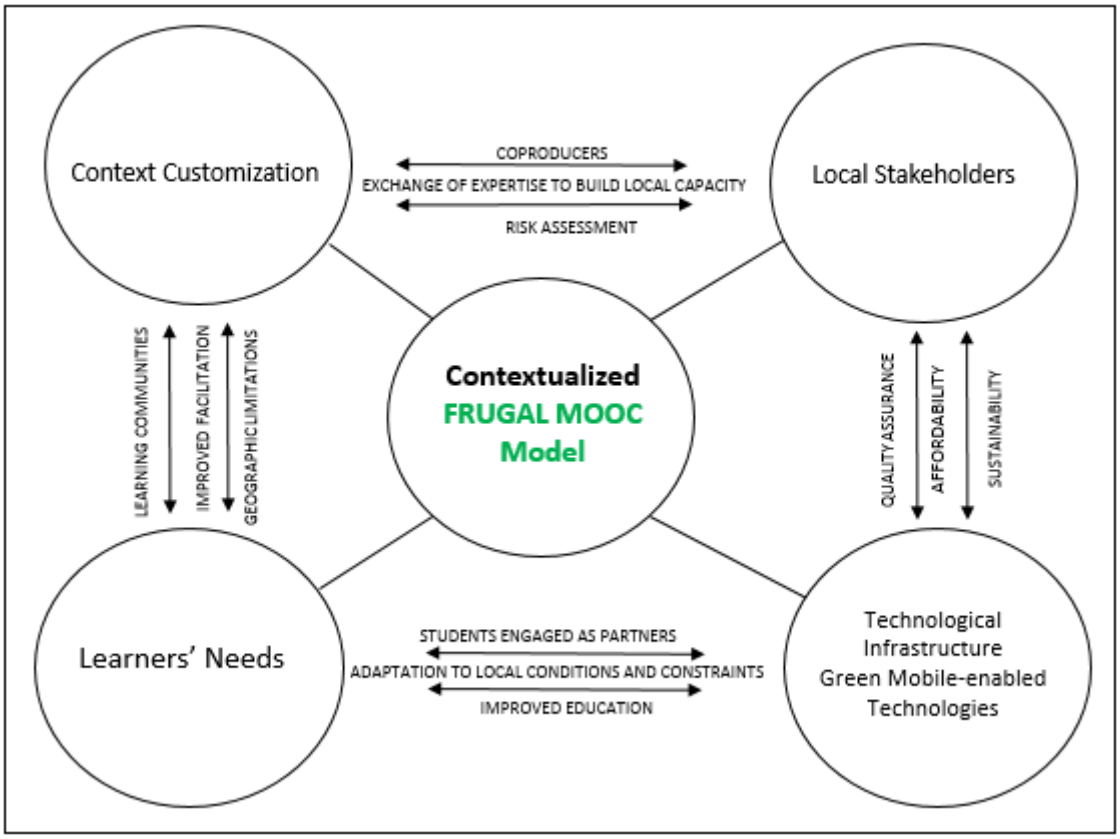

Figure 1. Frugal MOOC model.

The breakdown of the key elements of the Frugal MOOC Model in Figure 1—namely, content customization, local stakeholders, technological infrastructure and green mobile-enabled technologies, and learners' needs—and the interlaced competencies of frugal innovations and education as human right are unpacked in the following sections.

Content Customization and Learners' Needs Linked to Competencies of Frugal Innovations and Education as a Human Right

Content customization and learners' needs can safeguard *user value* providing the opportunity to disrupt struggling socioeconomic environments. This is because they can "bring products, services and systems within the reach of billions of poor and emerging middle-class consumers" (Knorringa et al., 2016).

The competencies of frugal innovations discussed above, namely ruggedization, and human-centric designs, align in the Frugal MOOC Model with geographic limitations, learning communities, and supporting local pedagogical approaches in local languages.

The features of education as a human right, namely, education being acceptable and adaptable are present in the Frugal MOOC Model through the customizability of Frugal MOOCs' content and the consideration of the needs of the learners.

Local Stakeholders and Technological Infrastructure and Green Mobile-Enabled Technologies Linked to Competencies of Frugal Innovations and Education as a Human Right

Frugal innovations are not just a strategy for sustainability; they are also associated with a "frame of mind" (Radjou & Prabhu, 2014). They have the ability to deliver "key social value" when effectively targeting "unmet needs" (Tiwari, Fischer, & Kalogerakis, 2016). This is reflected in the Frugal MOOC Model through the elements of local stakeholders, and technological infrastructure and green mobile-enabled technologies.

The frugal innovation competencies of affordability, simplification, new distribution models, lightweight technologies, and human-centric design are identified in Figure 1 as green mobile-enabled technologies and quality assurance.

The features of education as a human right (education being accessible and available) are present here through the development of Frugal MOOCs with local stakeholders in order to include learners and make them aware of MOOCs to, and to develop MOOCs through accessible technological means.

Learners' Needs and Technological Infrastructure and Green Mobile-Enabled Technologies Linked to Competencies of Frugal Innovations and Education as a Human Right

Aside from developing human-centric designs which are user friendly, MOOC functionality that identifies the "key demands" of its local uses enables greater long term growth (Fuchs, 2013). This idea correlates, in Figure 1, with learners' needs, technological infrastructure and green mobile-enabled technologies.

The frugal innovation competencies of using local resources and human-centric design are presented in the Frugal MOOC Model as the elements of adaptation to local conditions and constraints, students engaged as partners, and improved facilitation.

The features of education as a human right (education being acceptable and accessible) are present here through the contextualization and development of a structure of learning in MOOCs that is acceptable for refugee learners' needs that is contextualized through accessible technological means.

Content Customization and Local Stakeholders Linked to Competencies of Frugal Innovations and Education as a Human Right

The concept that MOOCs need to be well conceptualized and "tailor-made" (Mukerjee, 2012) for their target users is identified here through the correlation between "Content and Customization" and "Stakeholders." The emphasis in the Frugal MOOC Model is placed on satisfying the "fundamental needs" of the targeted learners.

The Frugal Innovation competencies of human-centric design and adaptation are presented in Figure 1 as the elements of co-producers and risk assessment, and the exchange of expertise to build local capacity.

The features of education as a human right (education being adaptable and available) are present here through the customization of Frugal MOOCs to learners' contexts and the development of Frugal MOOCs with local stakeholders to provide inclusion in and awareness of educational infrastructures.

Discussion

Countless studies have shown that increased levels of participation in higher education are significantly correlated with greater levels of socioeconomic development (Blanden & Machin, 2004). MOOCs as they are currently designed, however, seem to contribute to the increase of unequal opportunities that pose insurmountable challenges to underprivileged learners in developing countiries and to refugees who are forced into displacement throughout Europe, the Middle East, and Asia. With this focus, this exploratory study has aimed at developing a new appoach to MOOC designs. Thus, it has examined how the concepts of frugal innovations and the right to education, may be applied to MOOC designs.

In doing this, this study has examined the question: "What are the elements required to design a contextualized Frugal MOOC Model for learners who are displaced?"

To tackle this question we argued for the indispensable need to customize content, to engage all local stakeholders in the design process, to design mobile-enabled content according to the availability of local technological infrastructure and the prevalence and types of digital capabilities that learners have, and to identify the specific needs of learners who are often in complicated socioeconomic and educational environments. Through identifying these elements with the backing of literature and experts opinions, this study has endeavored to provide ways forward to a more adaptable and contextualized approach to MOOC designs for underprivligered learners, which could help improve the accessibility and usability of online learning content.

The opinions of the six experts led to the development of the interconnected elements of our Frugal MOOC Model. Their perspectives demonstrated the need for MOOC designs to be contextualized for learners and to incorporate frugality in order to become more inclusive and accessible to underprivileged learners such as refugees. Along with this, the expert opinions highlighted the need for a differentiation in the design of MOOCs for refugee learners, which may allow learners access to the (human) right to education. This, in turn, may have a greater impact on developing a knowledge-based society.

Discussing the Key Elements of the Frugal MOOC Model

The need for content customization emphasized current MOOC content design is often complex and comes laden with cultural values. MOOCs are in many instances irrelevant for, incomprehensible to, and inappropriate for refugees' and their circumstances. Attention to cultural differences, sensitivities, and nuances is extremely important when introducing online content and MOOCs into new challenging contexts. Unless the content and medium of instruction are aligned with the learners' background, language levels, digital capabilities, and culture, the impact MOOCs have for those displaced will be very limited. To mitigate such negative impacts, it is recommended that content is repurposed, discussed, and co-produced in direct and close consultation with local schools, instructors, and students.

Local Stakeholders demonstrated the need for diversified investments in order for MOOCs to have greater accountability to the communities they serve, and to have greater societal impact through

providing awareness of and access to MOOCs to these communities. Exchange of expertise between MOOC developers and local stakeholders is paramount. This will help build local capacity and create valuable content with risk assessment procedures put in place to ensure tailored content, monitoring of online engagement, and assessment practices, as well as achievement of learning outcomes. These suggestions may help palliate the shortage of qualified local teachers by inciting graduate students, alumni, educated elders and overseas global mentors to become facilitators and learning coaches in, for instance, WhatsApp learning communities. Involving local teachers in content development, writing of discussion guides in the local language(s), and facilitation will also encourage the creation of local communities of enquiry, support, learning, and practice, which are often the missing link in disadvantaged educational contexts. Close collaboration as *equal* partners may also help attenuate traditional and often ancestral hierarchies of authority or superiority. Take, for example, the Teachers for Teachers initiative in Kakuma Refugee Camp, Kenya, which was launched by Columbia University in partnership with UNHCR, Finn Church Aid, and the Lutheran World Federation with the goal of supporting refugee and Kenyan teachers in their efforts to improve their own teaching practices. In short, all stakeholders must be included from the outset.

Technological infrastructure and green mobile-enabled technology issues and their costs are vital to MOOCs as they can limit access to course content. Lack of connectivity and engagement can have serious consequences and may further decrease the betterment of "life chances, and social inclusion" (Clark, 2003). Despite rapid technological advances and the launch in many developing countries of affordable mobile devices, there is often inadequate or insufficient technological infrastructure such as steady electricity supply or high bandwidth Internet access to make appropriate use of such devices. It is therefore recommended that MOOC developers make use of frugal, cost-effective, power efficient, low-bandwidth hardware such as Raspberry Pi, and preloaded content on memory sticks coupled with hard copies, compressed video formats, and light-weight apps such as Binu, which could either be preloaded in low-end devices or easily downloadable in slow networks to access content. Locally-developed, portable, rechargeable (solar/wind), user-friendly Wi-Fi hotspot technological tools that support multiple devices with long-lasting battery backup such as BRCK are advocated for refugee communities.

When examining Learners' Needs, through our expert views and the literature, it can been seen that MOOCs are not considered suitable in their current form, shape, and design for the needs of refugee populations. A combination of factors such as poverty, remote geographical location, and sometimes ethnicity or gender put people at a significant disadvantage to gain an education, even at primary level. We therefore recommend through the Frugal MOOC Model the development of locally-relevant digital capabilities training programs as well as thorough needs' evaluations. These would help design relevant content, as well as appropriate diagnosis, tracking, intervention, and support structures drawn from evidence-based on on-the-ground expertise.

How Can This Model be Implemented? The Future Applications of the Model

The implementation of the Frugal MOOC Model is complex as it requires multiple parties to be actively involved in coordinated action—but it is feasible. On a wide scale it will require an active, multisector, multilevel, and systematic outreach with key international and local actors to ensure ownership and participation. It will also involve clear identification of key local contexts (i.e., cultural, ethno-linguistic, etc.) and issues (risk assessment) to contextualize content and delivery, as curricula in host countries that are taught in foreign languages are often unfamiliar to and difficult for many refugees. This will

necessitate establishing strong partnerships with key local influencers: ministers, municipal authorities and community leaders, social workers, refugee associations (which played a key role in the Calais "jungle" and the migration crisis in 2016, for example), UN agencies such as the UNHCR offices, NGOs, or language peer support programs such as the English Language Fellow Program. Partnership initiatives such as the Jamiya Project, Kiron, or Chatterbox are encouraging as they address learners' needs: they help refugees (1) get access to higher education; (2) credentialize or upgrade their vocational skills; (3) connect to other people in search of their skills; and (4) be remunerated. To maximize sustainability and durability, key structural barriers such as legal frameworks that allow refugees to obtain work permits or visas in their host country (special economic zones for refugees outside Zaatari camp in Jordan have shown promising results) and financial support (loan schemes or microfinancing to encourage entrepreneurship and help offset school burden as there is a lack of public schools and private school fees are too high) need to be addressed, and quality assurance processes need to be put in place.

All of these aspects and parties mentioned above contribute elements to the Frugal MOOC Model; however, their application and the development of MOOCs for refugees remains disjointed, as many, perhaps apart from Edraak (the Arabic MOOC platform), do not directly engage in the building and implementation of MOOCs in fragile contexts. One of the purposes of the Frugal MOOC Model is to address this by presenting a succinct approach to the provision, development, and future application of MOOCs for refugees. Therefore, on a more concise and implementable scale, two elements need to be defined for future application of the Frugal MOOC Model: (1) a *Frugal MOOC Platform* that can host and deliver refugee-led contextualized Frugal MOOCs; and (2) *Frugal MOOC Curriculum Experts*. Frugal MOOC Curriculum Experts would require knowledge and expertise in both the contexts of refugee learners from the perspectives of their socioeconomic environments and the necessity of involving various stakeholders. They would also require knowledge of online pedagogy and design for the development of contextualized Frugal MOOCs in vulnerable learning conditions. This would enable all the relevant parties to come together, including refugees as partners as advocated by Betts, Bloom, Kaplan and Omata (2017), and work in unison, effectively and coherently, to deliver contextualized MOOCs for refugees and others in fragile contexts.

Conclusion

With the increasing number of refugees and forcibly displaced people around the world, there is remarkably little scholarly research on how online learning, and MOOCs in particular, could be used in these fragile and difficult contexts. The authors of this article have therefore proposed a contextualized Frugal MOOC Model to cater to the educational needs of those in complex and difficult refugee contexts. The "first digital divide" refers to the gap between those who had access to computers and the Internet and those who did not. A "second-level digital divide" was identified by Hargittai (2001), which separates "those with the competencies and skills to benefit from computer use from those without" (Trucano, 2014). We argue that the inability to access contextualized MOOC content is creating a *third* digital divide. MOOCs in their current form, shape and design do not socially empower those who most need it in remote, rural communities and refugee contexts. Current online learning policies still stratify people by creating a meritocratic system, with those who have the means and capabilities to access and those who do not. MOOCs therefore still help in perpetuating (and increasing) educational divides as the best students get even better after taking MOOCs while many, from underprivileged or difficult

backgrounds, seem to still be denied these opportunities and the basic human right to education. They remain excluded, distanced, and even more globalized as they face increased hurdles to catching up with knowledge economies (Santandreu, 2017). It is only through a reconceptualization of MOOCs design, through taking on a frugal approach that is adaptable and contextualized, that the existing barriers of online education can be opened.

Acknowledgements

This research is part of the iterative progression from Dr. Mariam Aman Shah's doctoral thesis "*MOOCs without borders. Investigating the dynamics of a contextualised approach to scalable online learning*," which discusses inclusive and contextualized scalable learning through MOOCs for refugees and populations living in conditions of poverty. This thesis developed a theory in the form of the "*Contextualised MOOCs Model*" which identifies factors that can enable the development of contextualized MOOCs for the inclusion of refugees in and out of camps and displaced populations as well as other populations living in conditions of poverty. This theory and work is published through Lancaster University in 2020 (Shah, 2020).

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