Improving effectiveness of MOOCs

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Abstract: Massive Open Online Courses (MOOCs) are trending education technology, delivering learning experience to worldwide students. Although some state that it has sound pedagogy, others are skeptical of its effectiveness and whether it assists to provide 21st century skills. Drop outs of the MOOCs keep remaining at higher percentages while the problems of isolated learning, less interactivity and less collaborative MOOC models are lasting.

Using survey methods, this doctoral research preliminarily explored whether MOOCs provide 21st century skills, and also identified what factors affects the effectiveness of MOOCs. Then we built an effectiveness framework for MOOCs where we can identify design interventions and evaluate improvements. MOOCs form a new phenomenon which needs more experiments and understanding to provide best learning models for the lifelong learning community. Therefore, as next steps, we further sought exploring learning interventions to improve the effectiveness of MOOCs using the dimensions we found in the framework.

In the preliminary stage we used Grounded Theory (GT) methodology in discovering the factors affecting the effectiveness of MOOCs. In next steps, this research needs practical understanding, design and application of learning theories in a new learning environment. We intend to incorporate Design Based Research (DBR) methodology and Human Computer Interaction (HCI) methodologies.

Our intention is to discover a novel pedagogical design which will enhance the learning experience in MOOCs, thus implement and evaluate a prototype of a learning intervention where MOOC platforms can be utilized to increase the effectiveness.

Keywords: MOOCs, effectiveness, design base research, grounded theory, 21st century skills

1. Introduction

E-Learning has been practiced for more than 10 years. The term "E-Learning" is described as the use of electronic medium to learn remotely. In practice, E-Learning was less followed and in-person classroom-based didactic lectures were identified as a major source of educating students. However, with the time, technological development and the trending sociological culture, E-Learning became a solution for the universities and institutions to deliver education effectively and efficiently. Yet it was facing major problems such as students often complaining the isolation, less interactivity and less collaboration which they used to have in face to face class room environments. However, in 2012, a new phenomenal educational technology was introduced as MOOCs (Massive Open Online Courses). MOOCs are trending because it opened educational opportunities for many who cannot afford education offered by elite universities for free of charge, resulting thousands of enrollments to online courses. In 2012, New York times pronounced the year of MOOCs since giant MOOC players were introduced, such as edX, Coursera and Udacity. However, by 2016, MOOCs trends were identified to be fading.

The pedagogy of the MOOC typically includes small chunks of video lectures, formative quizzes, self-graded and peer graded assignments and discussion forums. Many researchers have identified that MOOCs provides a sound pedagogy and enhances the opportunities to learn. However, with the time (4 years since its introduction), some researchers questioned the quality of actual learner experience. They are skeptical of the MOOCs and claim that it directs to the pedagogically failed didactic education (Daniel, 2012). They argue that the learner is focused on lecture based learning where platform does not facilitate or encourage the skills required for 21st century such as critical thinking, collaborative learning. Many MOOCs found to be having only 15% completion rate leaving many learners unsuccessful to complete courses (Bali, 2014).

Many researchers attempt to address the MOOC completion rates issue by increasing interactivity or improving assessment with interventions. However, those will be a short patch for a broader problem. The broader problem is "How can we improve the effectiveness of learning experience in MOOCs?" This broader question can address by few objective questions: What factors affects the effectiveness of MOOCs? How can we measure the improvement of effectiveness? In what way MOOCs platforms can be improved or what solutions can be implemented and integrated into improve MOOCs platforms using the dimensions found above questions?

In this research we try to answer the questions and find solutions incorporating Grounded Theory (GT), Human Computer Interaction (HCI) methodologies and Design Based Research (DBR) methodology. It is mainly because of the fact that the problems of MOOCs mainly need attention in the social behaviors and human interactions. We understand, the basic question of "How can a large group of humans at any age learn better in online situations?" should be identified. Hence, this research continuing to understand the bigger problem and in this paper we first explain the background literature, the objective of the research and the methodology which will follow to conduct this research.

2. Literature Review

2.1 Background to the problems in MOOCs

MOOCs attract wide spread attention and rapidly changed the attitude towards online learning. Although constructivist or cMOOC existed since 2008 the xMOOC became the "buzz" word since 2012 due to the emergent of Coursera, Udacity, and edX. Since then many number of MOOC courses and MOOC platforms are emerging at a high rate. MOOCs are special due to the massive number of participants and open to any user who is interests to learn. Although many MOOCs offer free of charge, some MOOCs are issuing credentials or verify the authenticity at a considerable lower cost. MOOCs by nature have some common characteristics; short videos, quizzes, peer base or/and self-assignments and online forums (Glance, Forsey, & Riley, 2013) yet there are pedagogical differences in courses even in the same MOOC providing platform (Bali, 2014). Offering or participating a MOOC has benefits to each party, however concerns are arising on the real value behind MOOCs and the consequences of it. It is mainly because there are higher dropouts in MOOC, which means only 7-13% of pass rate or sometimes less than that complete the courses (Jordan, 2014). Although, researchers found MOOCs has higher gain than the students taking a class on-campus (Colvin, Champaign, Zhou, Fredericks, & Pritchard, 2014), some researchers doubt whether there is active learning taking place in MOOC (Daniel, 2012) (Downes, 2013). The situation rising from this background leads to a requirement of quality or effective MOOCs where it meets all the learning goals of a participant.

2.2 Quality of MOOCs

Effectiveness or quality factors for online learning are widely available with empirical evidence (Ehlers, Ossiannilsson, & Creelman, 2014; Downes, 2013; Conole, 2013). However, those factors will not be suitable for MOOC due to the unique features of MOOC. Hence empirical tests should consider MOOC participants or courses (Yousef, Chatti, Schroeder, & Wosnitza, 2014). We explored the previous studies which have been focusing on identifying the factors leading to an effective xMOOC which recognize quality factors. Recent researches found the theories behind the effective learning and teaching (Andrew & Soloman, 2013). It is important to identify the affections it brings to the E-Learning as well and it is the beginning of an exciting effort to understand how people learn and how to educate effectively at scale (Ho, et al., 2014).

3. Motivation and research questions

Main objective of this research is to improve the effectiveness of E-Learning experience in MOOC. We claim that the existing MOOC model does not support to meet the challenges face in 21st century. The existing model mostly follow the didactic lecture base learning, leaving less room for the students to critically think and work collaboratively. We claim that MOOCs are not effective thus MOOCs are

young itself, there are many opportunities and methods in attempting to find an effective balance. In doing so, we set our objectives in the research as:

1. identify what is needed by students to learn best in MOOCs, what factors does affect the effectiveness.
2. how can we improve the effectiveness of MOOCs using the discovered factors in 1,
3. introduce an appropriate pedagogical model/ theoretical framework to enhance the Learning experience, and
4. design a working porotype model on the enhanced pedagogical model and empirically test the improvements in effectiveness.

4. Research Methodology and work completed

The research consists of identifying, modeling, building and testing educational pedagogy for MOOCs where it will enhance the effectiveness. Therefore, different methodologies will be practiced in different phases based on the suitability.

- Phase 1 - Identifying what factors affect in the effectiveness - *Completed*
- Phase 2 - Developing a pedagogical model to enhance the effectiveness - *Work in progress*
- Phase 3 - Modeling a prototype and testing the improvements - *In future*
- Phase 4 – Implement in the prototype and integrate as a learning intervention - *In future*

In the first phase we mainly practiced Grounded Theory (GT) approach. The aim of using GT in this research was to understand the E-Learning culture and identifying users' behaviors and desires. Our main claim is that, after the introduction of MOOCs, previous E-Learning behaviors and expectations may have affected. The main focus was on individuals live experience of events in continuing E-Learning. It is important to understand the depth of social reality, contextual importance in the new Web 2.0 era. As we used this qualitative method (GT) in order to identify these affections, we assured that the researcher is involved in every step listening to human needs. We were responsive and adaptive to explore what actually the users in MOOCs find as effective. By the end of the time period, we discovered 10 dimensions affect to effectiveness of MOOCs (Gamage, Perera, & Fernando, 2014). This discovery directed us to introduce Network grouping model/ algorithm, where we can group the students in MOOCs so that they can work effectively than following a typical MOOC by isolating the participants. End of the phase 1, we presented a 10-dimensional framework for effectiveness of MOOCs (Gamage, Perera, & Fernando, 2015). In phase 2, we propose a MOOC learning model based on the theoretical framework and introduce learning interventions. Proposed model treats the students in small groups. The clustering into groups will be based on an algorithm depending on students' interactions. Introduce an effective peer reviewing model where we hypnotize an Identified Peer Reviewing (IPR) model. In that, students can see the peers they grade which is opposite to the blind peer review. Students in these small groups perform course activities individually and as a group by peer reviewing each other and collaborating in forums. Unlike the current blind peer reviewing model, we propose peers to know the graders and build upon a relationship in providing feedback and networking. The last 2 phases will follow the research methodology "Design Based Research (DBR)". This method can compose a coherent methodology that bridges theoretical research and educational practice. DBR is a blend of empirical educational research with the theory-driven design of learning environments, hence it is an important methodology for understanding how, when, and why educational innovations work in practice.

In future, we plan to test the grouping algorithm/ networking in a prototype of online course in local university and based on the initial results, we intend create a national MOOC integrating the prototype system designs to an existing LMS. It will represent the learning intervention and we hope to integrate Human Computer Interaction (HCI) methodologies where the artifact interaction will provide optimal results. The domain of the MOOC will be selected based on the demand and the trend we see in the country, where we can attract many learners to take part in the course.

5. Conclusion

The world is moving to many online learning technologies and MOOCs found to be one of the intervention. Although it started as a hype, still it faces many challenges, such as very low completion rates and students complaining the isolation, lack of interest, lack of motivation to continue the courses and poor quality courses are some of the reasons. In this research, our main objective is to improve the effectiveness of E-Learning in MOOCs. Effectiveness is meeting the learners' goals. Since MOOC is a very new phenomenon, the real behavioral expectations and patterns of online learners are new to the field. Rather than proposing solutions to a surface problem, we use Grounded Theory to identify the theory behind the effective online learning in MOOCs and plan to design solutions using Design Based Research Methods (DBR) and incorporate Human Computer Interaction Methods (HCI) in implementing new models. The research aims to introduce a learning intervention which will assist students to learn effectively and more collaboratively than the existing pedagogical models followed by the MOOCs. We believe that the new learning model design will aid students to meet the challenges in the 21st century.

References

Andrew, F., & Soloman, B. (2013). *Next Generation Learning:Pathway to possibilities.* EDUCAUSE.

Bali, M. (2014). MOOC Pedagogy: Gleaning Good Practice from Existing MOOCs. *Journal of Online Teaching and Learning (JOLT), 10*(1), 44-57.

C Gráinne, O. M. (2007). *Contemporary perspectives in E-learning Research: themes, methods and impact on practice.* Oxon, UK: Routledge.

Colvin, K. F., Champaign, J., Zhou, A. L., Fredericks, C., & Pritchard, D. E. (2014, Spetember). Learning in an Introductory Physics MOOC: All Cohorts Learn Equally, Including an On-Campus Class. *The International Review of Research in Open and Distributed Learning (IRRODL), 15*(4).

Conole, G. (2013). MOOCs as disruptive technologies: strategies for enhancing the learner experience and quality of MOOCs. *Revista de Educación a Distancia, 39*, 1-17.

Daniel, J. (2012). Making Sense of MOOCs: Musings in a Maze of Myth, Paradox and Possibility. *Journal of Interactive Media in Education*. Retrieved from http://www-jime.open.ac.uk/jime/article/viewArticle/2012-18/html

Dede, C. (2005). Why design-based research is both important and difficult. *Educational Technology, 45*(1), 5-8.

Downes, S. (2013). Retrieved from The Quality of Massive Open Online: http://mooc.efquel.org/week-2-the-quality-of-massiveopen-online-courses-by-stephen-downes

Ehlers, U.D., Ossiannilsson, E., & Creelman, A. (2014). Perspectives on MOOC quality - An account of the EFQUEL MOOC quality project. *International Journal for Innovation and Quality in Learning-INNOQUAL -, 2*(3). Retrieved from http://papers.efquel.org/index.php/innoqual/article/view/163

Gamage, D., Perera, I., & Fernando, S. (2014). Effectiveness of eLearning through MOOC: lessons learnt in selecting a MOOC. *The 22nd International Conference on Computers in Education (ICCE 2014).* Nara.Japan.

Gamage, D., Perera, I., & Fernando, S. (2015). A Framework to Analyze effectiveness of eLearning in MOOC: Learners Perspective. *7th IEEE U-Media conference .* Colombo: IEEE.

Glance, D. G., Forsey, M., & Riley, M. (2013). The pedagogical foundations of massive open online courses. *First Monday, 18*(5).

Ho, A. D., Reich, J., Nesterko, S., Seaton, D. T., Mullaney, T., Waldo, J., & Chuang, I. (2014). . (2014). HarvardX and MITx: The first year of open online courses . *HarvardX and MITx Working Paper* (1).

Jordan, K. (2014, February). Initial Trends in Enrolment and Completion of Massive Open Online Courses. *The International Review of Research in Open and Distributed Learning(IRRODL), 15*(1).

Reimann, P. (2011). Design-based research. *Methodological choice and design*, 37-50.

Yousef, A. F., Chatti, M. A., Schroeder, U., & Wosnitza, M. (2014). What Drives a Successful MOOC? An Empirical Examination of Criteria to Assure Design Quality of MOOCs. *Advanced Learning Technologies (ICALT) IEEE14th International Conference*, (pp. 44-48).