Effectiveness of eLearning: Grounded Theory approach

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Abstract— **Effectiveness of eLearning has been identified as an important aspect. It determines whether the stakeholders achieve the goals of eLearning. Unlike earlier, eLearning rapidly changes with the introduction of Massive Open Online Courses (MOOC). Since many students got access to experience eLearning via MOOC, perceptions of the factors leading to an effective eLearning changed according to current needs. Many users drop out of eLearning courses due to the fact that it is ineffective in many aspects. It is timely and necessary to address the needs of the users in order to achieve success in eLearning. Finding solutions to the above problem, this research used Grounded Theory (GT) methodology in finding the factors affecting an effective eLearning. We found 10 dimensions which affects a successful eLearning while actively participating in 16 eLearning courses in 5 different platforms in 2 years. This paper explains the process of Grounded Theory approach which ultimately resulted in the dimensions and the explaining factors in the dimensions leading to a successful eLearning.**

Keywords—effectiveness; eLearning; qualitative; MOOC

I. INTRODUCTION

eLearning has been practiced in the world for many decades. The technological requirements, infrastructure, lack of readiness of users and fewer acceptances by the society led to ineffective eLearning [1]. But timely due to the improvement of ICT in world, demand for the eLearning increase in the community. Although there is a demand for eLearning, it faces challenges due to the fact that users encounter many problems. Many researchers argue and introduce success factors to provide effective eLearning. Many of the factors are in dimensions such as technological, learner, instructor, environment, and design of course [2]. However, the introductions of Massive Open Online Courses (MOOCs) are changing the view of eLearning stake holders [3].

MOOC is a practice of eLearning, which is open to the world; any interest participant attends and accesses courses and materials for free of charge. This leads thousands of participants signing up to MOOC courses every day. At the same time number of MOOC providers increases due to the demand and interest in this rapidly emerging concept. Due to this demand many universities and institutions attempt to provide eLearning courses. At present with users being exposed to many eLearning platforms and pedagogical designs, their perception of factors affecting effective eLearning is changing. Researchers claim that the MOOCs approach of eLearning is successful and therefore it attracts many students to study online [4].

eLearning effectiveness is meeting the users learning goals and needs. Due to the open platforms students learning behaviors and expectations of an eLearning course are affected in terms of effectiveness. Our research attempts to identify the latest dimensions which affect the effectiveness of eLearning from the perspective of the user.

Our research is unique in that we incoporated Grounded Theory (GT) method to explore the dimensions which users see as important factors to provide an effective eLearning expereince. The GT, which was introduced by Glaser and Strauss [5] is a powerful theory to identify social aspects of research. Our goal is to understand the behavioral process that leads students to choices and thus we take a causal perspective to provide an overall deep view of a novel phenomina. We claim that the introduction of MOOC changed the behaviours and expectations of students in eLearning context and therefore we provide the dimensions after proceesing the data gathered from Grounded Theory (GT).

In this paper, first we idenfy the work related to identifying problems and worked through GT methods to find the solution. As a result we revealed 10 dimensions which will affect an effective MOOC platform as per students view. Finally we discuss the criteria in the dimensions and conclude with further remarks.

II. REVIEW OF LITERAURE

Although we used GT method to find the latest dimensions in eLearning, it is not commonly used in educational research. However, the research done by Crittenden [6] found that GT is important to eLearning researches since the data produced by GT gives the best possible insights into the students and their experiences. It also provides flexibility to the researcher as it does not assume hypotheses. Nevertheless, GT was a challenging opportunity to learn something new and at the same time discover some pedagogical implications of what it is like to learn online. Also the researcher claims many GT research works are challenging as it consumes more time but the output data will contain trustworthy valid theory which has emerged from the process [6].

Researchers identified that the nature of GT approach to educational research is not built upon a structured and pre-determined methodology, but rather it represents a strategy for continually redesigning research in the light of emergent

concepts. This kind of flexibility not only aids the creative generation of a conceptual framework, but also ensures that it is intimately linked to data. For educational researchers, then, this anthropological strategy provides one opportunity whereby they can become more closely attuned to empirical data [7].

GT approach was incorporated in a few eLearning research works. One such research was to understand the social context of the UK online community and issues around the creation and exchange of knowledge within and between online communities [8]. Another research was carried out using qualitative method focus groups to investigate and analyze critical success factors (CSFs) that are required to deliver eLearning within higher education (HE) courses and programs. Their results revealed from the GT approach were staffing issues, pedagogically sound delivery models and training of both tutors and students. Also they claim that the institution must play a leading role in order to achieve successful eLearning [9]. However, in this research authors focus only on the experts drawn from administrative, educational, technology and research domains [10] whereas research done by Ehlers [2] to find the reasons for successful eLearning emphasizes the importance of learners' perspective than the experts view in the eLearning field. However, Ehlers research was based on quantitative methods [2].

The research conducted by Glibert, Jennifar and Rowley [11] also attempted to identify the eLearning experience in students using GT. They defined the experience in terms of satisfaction and claim that the criteria used by students when expressing satisfaction are: synergy between theory and practice; specific subject themes; discussion forums and other student interaction; and, other learning support. However, the process of GT was carried out only to analyze the comments generated in a questionnaire where they incorporated quantitative methods as well. Following similar steps in the GT research approach, Adamopoulos [4] presents a novel analysis using user generated online reviews to find the factors which make a great MOOC. At the same time they claim their process of GT was used in a quantitative study. However, the GT introduced by Corbin and Strauss [12] is based on qualitative study and argue that it is not appropriate to apply criteria ordinarily used to judge quantitative studies. At the same time Strauss [13], empathizes with the importance of active human involvement in the GT study rather than being a passive data collector. We claim that our methodology is solely conducted with active human participation in the courses and based on the process of the GT analyzing behaviors and patterns stated by the participants and we have reasoned and depicted the detail process.

Apart from that in terms of effectiveness, the literature supports a wide range of reasons to high dropouts in MOOC [14], [15], [16]. According to Wang [17], three major areas affect retaining students in MOOC. Those were explored under social and cognitive perspective, namely lack of self-efficacy, lack of self-regulation and lack of self-motivation. But another research by Liyanaganawardena, Adams and Williams [18], claims dropping out is often challenged by different viewpoints and suggested that it is merely failing to achieve personal aims. Nevertheless the student retention problem was researched by Cook [8] and Russell et al. [19] to identify the key values of a course in an education system and at the same time Mackness and Williams [20] write about the question of how to design a course which will provide satisfaction to the participants. Among other works in this direction, Masters [21] discusses how the roles of instructor have changed while Xu [22] examines the extent to which student's performance in online and face to face situations. However, researchers claim MOOCs represent the latest technology opportunity where the potential pedagogical impact needs to be researched and stress the importance of understanding participants' perspective of eLearning [23].

III. METHODOLOGY

The aim of this research was to understand the eLearning culture. Our main claim is that, after the introduction of MOOCs, previous eLearning behaviors and expectations may have affected. Our main focus will be on individuals live experience of events in continuing eLearning. It is important to understand the depth of social reality, contextual importance in the new Web 2.0 era. As we used a qualitative method GT theory 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 eLearning field find as effective [12].

GT studies begin with open questions and researcher presumes that they may know little about the meaning that drives the actions of their participants. In this case, we sought to learn from participants, with many MOOCs or open learning environments. We decided to gather data from MOOC participants after a preliminary search of where the students found effective eLearning experience. We began to explore online students and inquire whether the MOOC is effective to the learner, why it is effective and what students in massive learning environments perceive as effective to the learning.

First questions initiated by us were open ended and focused on the social aspect and the back ground of the study. Few initial questions were as follows:

- What courses do you study in MOOC?
- How do you manage your life while participating in courses in MOOC?
- What is your general view of the courses you have taken?
- What are your likes and dislikes in these courses in MOOCs?
- Which features in MOOC provided an effective learning experience?
- Why do you say it is effective?

A. Sampling

Generally, in processing with GT, students are characterized by the theoretical sampling. However, to

proceed with theoretical sampling, it requires some data to collected and analyzed thus initiated with purposive or judgment of the researcher. The total participants in all the MOOC platforms as at now provided the population for our study. Some of the platforms are Coursera, edX, Udacity, NovoEd, Udemy, Iversity, future learn, Open2Study ect. For example 2 million users from more than 196 countries enrolled in at least one course [24].The sampling techniques evolved and changed during the period of the research, often using the purposive sampling technique. Therefore, purposely we selected very active users of eLearning where they have carried out the practices at least 6 months. We define active students by mean if they participate actively in the forums, watch the videos, and take assignments and quizzes throughout the course.

B. Data Collection

In order to formulate the theories grounded on data, we enrolled in 16 MOOC courses from 5 different MOOC platforms over a 2 year period of time. The 5 platforms were Coursera, NovoEd, edX, Iversity and open2study. Data was collected and gathered through observations on forum postings, social media postings, formal and informal interviews. Beyond that we selected a few very active users by means of those who interact in the forums very often than usual students in each platform. Then we connected with them informally and spent time apart from the course to observe the livelihood of an active user. We processed our data collection through 41 very active online participants. Qualitative researchers have recommended sample sizes ranging from as few as 6 participants to as many as 30 for a grounded theory study; however, no rationales exist for those recommendations [25]. Therefore based on that argument the sample size in our research is adequate to produce valid results.

As we were participating in the courses, we were building relationships with students during the courses in order to be actively engaged in gathering data. At least one course was selected from 5 platforms. Initially data was gathered by observing the problems students face in the platforms, how they react to the problems, what they post in forums, what are the threads inside the course consist of and also outside the course via social media and Coursetalk (a network of sharing information reviews of courses). Then we selected students who contribute to the course very actively. Generally the active students are those who submit assignments, take quizzes and contribute to the forum much more than an average student. At least 30 mints in depth interviews were designed with 1 participant or a group of participants. Though the interviews were semi structured, we provided casual movements as not to restrict the open answers. All the interviews were conducted via skype or Google hangouts. Participants were from various countries such as US, Europe, India, Egypt and Mexico.

IV. DATA ANALYSIS

A. Coding

The coding process occurred in stages; in the initial coding process we gathered as many ideas as possible inductively from early data of the initial questions. In focus coding, our research selected some central codes and explored a meaningful pattern from the entire study based on the selected codes. In order to select such central codes, we were required to take decisions about which codes will contribute more in providing a meaningful relationship or which is very important and contributes more to the study.

After the initial coding we refined the categories, dimensions and factors in the theory and identified the relationships to one another. This process was initially introduced and carried in the research by Glaser [5] and also lately was emphasized by Charmaz [26] to improve the actions to produce codes where it reduces the time and improves the quality of the findings. By this process the data will be more similar to codes and will support theory efficiently.

In this research we developed a framework of codes in order to categorize the raw data collected from interviews and observations. After the initial coding, our research resulted in focus codes as depicted in Table 1 where it will group the evidence of what students refer to as an effective eLearning.

B. Theoratical Sampling

Theoretical sampling is central to the GT. As states by Bryant and Charmaz [27], a theoretical sampling is performed by coding, comparison and memo writing. It is designed to serve the developing theory. The analysis or the researcher in this case, raises questions, suggests relationships and models, highlights gaps in existing data and reveals what the researcher did not yet know and what sort of questions needed to pay attention to.

We already described the initial sampling derived from the population. Our population is the total participants in the MOOCs. Our sample was initially gathered from students in Coursea and later edX, NovoEd, Iversity, Open2Study. After the initial data collection and analysis, we practiced theoretical sampling to determine which kind of participants to select next and what kind of questions to interview and what kind of data to observe deeply.

TABLE 1.   FOCUS CODES

Focus Code	Description
1. How users engage	How they talk communicate keep them engage with peers, Material/Content, Instructor
2. The Technology support	How was the introducing new technology changed the eLearning perception
3. The way the course arranged	Manner that course was designed to support the needs of the user
4. Motivation to do the course	How motivated the student to take courses online
5. Usability of the whole system	Is it user-friendly to access the platforms and media
6. Slides, resources, teaching material	Do the system or the platform accommodate users needs and support

7.	Evaluation of the course	How the evaluation of courses carried out

However, we did not realize in the initial observation that some students conceptualize or desired to have features as effective to the platform. In other words they conceptualized if they could have some features, which the platform did not support or never thought about it before. Those concepts arise at the time they really participated in a course and felt effective as if they have in integrated in a particular MOOC. In that occasion, we added questions to the interviews focusing on what would they desire or conceptualizing features which could bring more effectiveness to the MOOC. We conducted the questions until we found a course which really supports our claim. Then we focus more deeply into the feature and ask questions from the participants who experienced it. For an example students were unclear about the direct benefit from the participation of the courses in MOOC. Many of the students happen to participate merely to improve their knowledge and as a result it could benefit them in their daily chores or the institution they work. In this case student's claim the ineffectiveness arises because as at now there is no standard recognition or accreditation on the MOOC courses. Nevertheless, Entrepreneurship 15.390X offered in edX platform changed it as introducing bridges between the course and the real world industry by third party platforms (i.e. Coursolve). This experience by students introduced a new direction to our focus code model. While participating more in courses we identified that when students state about the engagement, the activities could be well explained by interactivity and collaborativeness.

C. Theoretical Coding

After defining the focus codes in theoretical sampling, our approach was to process theoretical coding. We finished the major focus codes, which contributed to describe most of the data. At this time our study researched theoretical saturation. This often interpreted as the situation when the researcher does not hear anything new from the participants [26]. Table 2 describes the theoritical codes.

TABLE 2.   THEORITICAL CODES

Theoretical codes - Dimensions	Factors supports to dimension
1.Technology	HW support SW support Media and Mode of delivery
2.Pedagogy	Student interaction with faculty/ tutors/ students Learning pace Methodology followed by lecturers design
3. Motivation	Attention Relevance Confidence Satisfaction
4.Usability	Interface design learning environment Navigation Feedback
5.Content/ Material	Relevancy Updated Rich collaborative information
6.Support for Learners	Psychological and social support for students Administrative support Student complaints procedure
7.Assesment	Martial assessment Collaboration assessment Periodic course/program evaluation by various means Periodic review of faculty/staff performances Evaluation of student satisfaction levels Regular review of student achievements
8.Future Directions	Recognize by the industry Direct to opportunities Expose to other Networks
9.Collaboration	With learners With instructor's With Faculty With industry
10.Interactivity	With peers, Material/Content, Instructor

D. Validity of the Dimensions

The results from the GT study was expressed as a substantive theory, that is a set of concepts related to each in cohesive manner. In our findings, we fleshed out each major code, examining the situation in which they occurred and why it occurred. At the same time we reached theoretical saturation where we were able to cover the aspects of effectiveness according to the student participant's perspective. We did the diagram of design, written memos and rigorously searched the dimensions which not covered to eLearning. Our theory of 10 dimensions affecting eLearning related to one another in a cohesive manner, now accounts adequately for all the data we have collected. We have presented the developing theory to very active MOOC participants and found it was accepted and resonated the dimensions. At the same time the dimensions were presented to experts in the eLearning field intending to have the results validated. Since the process is conducted through ethnographic qualitative research method GT, we intend to conduct a statistical analysis as the future work for this research.

V. DISCUSSION

We provide an answer to the main research problem, "what are the factors affecting effective eLearning"? The research used a qualitative method GT and found 10 dimensions affecting effectiveness in eLearning. The main argument of the research is that there have been many success factors identified in the field of eLearning; however after the introduction of MOOC, the perception of the users with regard to effectiveness has not being identified. At the same time we used GT which is a powerful qualitative method for identifying the changes in new phenomena's [26].

Out of all 10 dimensions, our research found network of opportunity is a very important dimension which was not identified in any research. It is a very important fact that student's value, which has not been considered in any occasion earlier, has been identified. This is not merely

employment, but the students valued the introductions of further groups where they can practice what they learn or keep in the network. They valued the relationships built during their online courses. It was found that students learn more of the interests' topics through the interests groups they found online while learning in a course. Since many of the platforms of MOOC do not provide a feature or do not facilitate or promote the network culture of learning, often students find social media as their learning space. However, during our participation in courses and interviews we found that this culture of network being able to publish the work to the outside via social media was facilitated by the NovoEd platform. From time to time some of the courses in Coursera platform allowed students to share the work with a link provided where other interested students can provide feedback on the work; but often students were not encouraged or their behaviors are somewhat different from the intention of building a relationship for further learning. We recommend to the platforms or the instructors to initiate the culture where students build relationships among other students who exhibit common interests in academic work and facilitate them through their learning journey to build the network of interest groups to study.

"…. I really like the connection we had while we were doing the team work, most of us had the same interests in common and we even worked beyond the group work, sometimes we gathers in hangouts to talk about the work we do and learn from each other sort of like brainstorm … "

It is understood that there is a gap between the learnings and the needs in the industry. Students valued the path to contribute to the needs of the industry. They often complained that it is very rarely that they get a chance to implement or practice what they learn in a course in the real world. Some courses in the MOOC platforms catered to this in many ways, which students found very helpful and effective for their learning. Such that the Entrepreneurship 15.390X, the course offered by Massachusetts Institute of Technology in edX platform, bridged the gap between learning and the industry needs by facilitating students to take part in the industrial needs published in a platform (Coursolve.com). In other cases, students were directed and introduced to the industrial perception of the learnings by live webinars with guest panelists who are key relevant people from industry. It is not common that these effective practices are followed in MOOC platforms. In this research, we found that students highly valued such activities and it is a very important dimension for a learning to be effective.

"… I was overwhelmed for the chance I got to execute what I learnt it the 15.390 MIT Entrepreneurship course via edX. In the class we learnt how to identify your customer and in the class offered me a link where I can find industry who is seeking collaborations to similar need .."

Another dimension, usability of the platform plays a valuable role in effective learning. As the participants point out some of the platforms navigations are difficult to trace and often lacked in usability heuristics. Many of the participants regarded the easy and simple style of web interfaces and the similar functions to be attractive and made it easy to navigate through the site. Among the functionalities in the system, assignment uploading, forum postings, watching video clips, submitting quiz answers were identified as very important to provide a usable framework. At the same time this research found providing help to the students with regard to platform problems were very important and contribute to an effective learning. In particular to MOOC the students feel they must have a contact point in the internet where they can request help for platform matters.

"…it's important that I have a contact point to request help as I recall I was unable to submit my assignment due to the network problem where the course platform supported me with the matter after I contacted through the link provided by the platform…"

Another important dimension "Interactivity" found in the research plays a major role. We found that initially students valued level of engagement with course and participants were important to a successful learning outcome. We further analyzed and found the engagement varied with different levels. Mainly the students seek interactions between other students, content and also the instructor. These interactions triggered collaboration and motivation to study which was then found as being effective in learning from MOOC. Students stated that many MOOC providers do not pay attention to the level of collaboration, whereas most of them tried to cover the interactivity part. In the revolutionizing of education it is very essential that participants learn from each other rather than just learning from a guided curricular [*28*]. In our research, we discovered the fact that students presented much interest in learning from each other.

Participants found that careful attention to pedagogy and the assessment as effective to their learning in MOOC. They often claimed some of the courses had only quizzes to assess and they found it as less encouraging to an active learner. They preferred to learn by doing, where the best way to assess is the overall view in the course. It is often an aggregate of participation in group work, Apart from material assessment, helpful peer grading and students also valued the assessments of their motivation to the course as well. At the same time the pedagogical changes that took place in the MOOC era have many values that students grasped as being effective for their learning. Much of the practice is in the way in which the course is conducted; having small chunks of videos, engaging in questions at the end or in the middle and students often claimed the video presentation style was important as well.

VI. CONCLUSION

We tried to elaborate a detailed analysis of an emerging phenomenon, MOOC which is wide spreading in educational reformations. The number of MOOCs and platform providers keeps on rising with the demand for electronic learning. With

this development, the user's perspective of the effectiveness of eLearning has been affected. It was important to identify the factors affecting to an effective eLearning in MOOC platform.

In this research we explored answers using the GT methodology introduced by Glaser [5]. We found that there are 10 dimensions which a participant values as effective in eLearning. Those are namely interaction, collaboration, motivation, network of opportunity, pedagogy, assessment, content/material, technology, support for learners and finally usability. Our research uniquely identified the network of opportunities as a dimension which any eLearning course should consider implementing and adapting. It is crucial that the participants should establish some connections in the network to share experiences and learn from them and at the same time it is very important for any student to connect, collaborate with peers, students from other networks and industry.

The 10 dimensions found in this research will be a guide and should be emphasized by any platform in order to provide an effective learning experience. At the same time it is important to keep identifying the changing patterns of behaviors in students while taking the MOOC courses, whereby e more affecting dimensions can be identified which will contribute to produce an effective eLearning experience.

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