The Comparison of MOOC (Massive Open Online Course) Platforms of edX and Coursera (*study case: student of programming courses*)

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Abstract— **The recent development of e-learning platform has provided the learning environment with exciting experiences to teach a various and massive learners population using MOOC (Massive Open Online Courses) platforms such as edX, Coursera, etc. A large user uses these platforms to enhance their competency and improve their skills. Numerous platform of MOOC has been implemented in higher education institution, and the public debate about MOOC is growing; is the platform relevant to be formal education or not. Therefore, this research objective is to explore the MOOC's features, particularly, to identify the difference platform of edX and Coursera. Those platforms have the most significant number of learners; in learner's perspectives through the Resource Activity Support Evaluation (RASE) pedagogical method and learning activity components, which consists of Absorb, Do, Connect activity. The study conducted at a private university in Indonesia with 60 students as respondents and they were also involved in experiments activity to use MOOC's platform. This study used quantitative approach to identify the difference platform between edX and Coursera. The significant results from this study can open mind the researcher to understand the uniqueness of MOOC's platform particularly in edX and Coursera, and it also can be considered as a starting finding toward advanced research in education technology area for the higher education institution.**

Keywords— e-learning, MOOC, edX, Coursera

I. INTRODUCTION

Internet technology provides higher education institution with many interesting platforms that can be used to improve learning experience [1]. It is common practice for higher education to use the advanced technology to facilitate teaching and learning activities more interactive [2], such as e-learning. MOOC's unexpectedly recognized as number one among all e-learning technology in Horizon Report 2013. The recent technology of Massive Open Online Course (MOOC) has provided learners with exciting opportunities to learn through many kinds of learning platform, such as Coursera, edX, udemy, etc. [3] and it has the most significant potential in academic fields that are shown by the implementation of this platform into many universities [4]. In MOOC anyone can be a lecturer who has competency to teach or to share with others [5]. The popularity of these platforms can be seen from the number of learners in these platforms. Based on data collected by Class Central, the number of students who signed up has achieved 35 million [6]. Coursera as the largest online course provider added 7 million new members. At such scales, interaction with the other participants is infeasible, and the most interactions are through MOOCs' platform than face to face.

Considering the popularity of edX and Coursera, user familiarity with the interfaces and workflows can be advantageous in the learning context [7] because students are more likely to engage and communicate through this platform. Moreover, in MOOC all user activities on assignment and forum can be observed literally [8]. Therefore, in this study, we want to identify the main features of MOOC according to e-learning activity (Absorb, Do, and Connect activity) and RASE (Resource Activity Support Evaluation) pedagogical perspective, and to find out whether this platform is part of a global open learning environment. The focus in this study involved edX and Coursera as well as the conclusions derived from the experiment result. Our priority concern is to track the learners' perspective and activities, so we can find out various features of MOOC that is relevance with higher education institution perspective. First, we will introduce a description of the main features of edX and Coursera. Then, we will examine the results we have obtained, and the students' perspective on this platform.

II. THEORITICAL BACKGROUND

MOOC

Currently, MOOC (Massive Open Online Courses) is popular as e-learning platform which support collaboration platform. MOOCs can be identified as aggregate classes from many institutions, universities, and schools; which collaborated using a digital platform [9]. Learners and instructors depends on timing of classes [10]. This system is designed to enable the learning process to enormous learners. In this system, there are many courses offered on many topics, which for free or in charge. Even though MOOCs have been broadly recognized, but there is still plenty of room for improvement as far as informal education need. It is the duty of the academic community to solve the problems of MOOCs, trying to identity actionable solutions [11]. Since MOOCs are relative new technology, little research has been done to explore the pedagogical model and learning activity [12], so in this study we will explore in the pedagogical and learning activity perspectives.

RASE

RASE (Resource, Activity, Support, Evaluation) pedagogy model is developed to the support institution which uses online learning platform, such Moodle, Blackboard, etc., that can be running effectively, student-centered, and increase engagement to achieve learning objectives. In RASE model, the identified resource is not enough to gain learning performance. It is also needed a plan from the learning activity for learner to use many kinds of resource learning. Also, support is needed to help learners independently using their learning platform, and in the last all activity has to be evaluated at the end of the session to monitor learning progress and learning outcome [13]. In Figure 1, it is the detail activity to support RASE model.
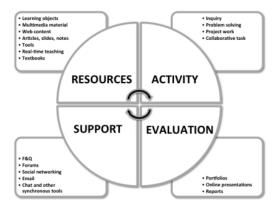

Fig. 1.   RASE Pedagogy Model [14]

The RASE model can be divided into two perspectives, which are instructional and learning approach. Based on the instructional approach, the model guides the instructor to develop a student-centered approach as well as using education technology platform. Then, from learning perspectives, the model support learners to learn disciplinary content and build

new literacies [15]. This research focused on the RASE model for instructional approach.

e-Learning Activity

The learning activity is important to get the learning experience for learner because in the learning activity will train basic skills, thinking process, and learner behavior. In learning process, a person will be trained from simple activities into difficult or complex activities. The learning process, in general, can be classified into three phases of activity, which are [16]:

1. Absorb

    In the absorb activity, the participants will read, listen, and watch. Some forms of activities that can be performed in the absorption phase are presentations, reading of books/articles, narration, excursions, etc. In this stage, the participants are physically passive but mentally active.

2. Do

    In the Do activity, the participants are usually carried out actively, such as training, exploration, and search. The realization of this phase is training activities, experiments, games, etc.

3. Connect

    In the connect phase, the learners begin to connect what has been learned to be implemented. Some of the Connect activities are activities to ask, analysis, retelling, doing practical work, and research.

III. RESEARCH METHODOLOGY

The data source of this study is the experiment using two MOOC platforms, which are edX and Coursera. This treatment is intended to explore one or more condition widely. Experiments are set it up based on edX and Coursera environments. The reason for setting up the situation is the thought that it will be more appropriate with the current condition context to evaluate features systems which can be easily analyzed, and it can reflect the actual situation.

All participants in this experiment are filtered by some of the criteria, such as they already used MOOC platform before either edX or Coursera, and they take the similar learning course. For this study, participants take programming course for one period of registration. However, the programming courses are favorable courses for MOOCs users. So, it can drive positive response to follow the course regularly. In this study, we use convenience sampling which involved 30 participants for both treatments, then to investigate the result we use t-test for 2 group samples. The result will show the significant features of MOOCs to support learning activities.

IV. RESULT

To extend the understanding of MOOC platform, this study investigates the difference MOOC features between edX and Coursera. In comparing the two platforms, edX and Coursera, we tested both platforms to measure user satisfaction on MOOC platform, based on the pedagogy of online learning features, using RASE components and learning activities using the Absorb, Do, Connect functionality.

In this section, we present some results concerning the student's experience during one semester of e-business course. Table 1 is the descriptive profile of respondents who involved in our experiments. The students come from one private university in Jakarta.

TABLE I. DESCRIPTIVE PROFILE RESPONDENTS

Variable	Category	N Respondents	Percentage
Gender	Male	54	90%
	Female	6	10%
Age	17	1	2%
	19	32	53%
	20	23	38%
	21	3	5%
	23	1	2%
Education Background	S1	60	100%
Platform	Computer	51	85%
	Tablet	9	15%

RASE (Resource Activity Support Evaluation) Pedagogical Model

The RASE pedagogical learning model emphasizes on four components, which consist Resources, Activity, Support, and Evaluation.
- Resources include content (textbooks, digital media, additional material by instructor), material (canvas, paint, chemicals), tool (brushes, rulers, calculator, statistical analysis software, laboratory tools)
- Activity consists of problem-solving, project work, inquiry, collaborative task
- Support consists of Forum, F&Q, social networking, email, chat and other synchronous tools
- Evaluation consists of Portfolios, online presentations, reports.

For every component will be measured using interval measurement because the questionnaire used Likert scale in four options, so the range will be:

$$Range\ Interval = \frac{4-1}{4}$$
$$= 0.75$$

Table 2 shows the interval measurement of the RASE pedagogical model in this study, which divided into four ranges from very unqualified to very qualified.

TABLE II. INTERVAL MEASUREMENT

Interval	Description
1.00 ≤ x < 1.75	RASE components very unqualified
1.75 ≤ x < 2.50	RASE components are not qualified
2.50 ≤ x < 3.25	RASE components are qualified
3.25 ≤ x < 4.00	RASE components very qualified

After we have the interval distribution, then we measure every component in RASE model to observe what activity and conceptual knowledge in MOOCs platform. Table 3 is a visualization and summary of the RASE pedagogical model for edX and Cousera. The result showed that every RASE's component either in edX or Coursera majority meets the qualification of standards, except:
- Support Component
  In Coursera platform, video features which enable the instructor to do streaming from internal system or live video conference between instructor and learner or both learners showed the interval value of 2.233. It means that video feature in Coursera is still under qualification as the supporting activity in their platform compared to edX's video features.
  Moreover, in edX platform, the feature of Bookmarking to a specific course and tracking to learning result are also under qualification to support activity in edX learning platform compared to Coursera bookmarking and tracking features, which the interval values are 2.4 for both.
- Evaluation
  In evaluation, Coursera showed that for this functionality features assessment to peer participants (2.46), assessment result (2.46), and generate certification (2.4) still below qualification, which can be seen from interval values of each activity are below 2.5.

TABLE III. RASE MEASUREMENT

VARIABLES	INDICATORS	COURSERA	edX
Resource	Search engine to access learning material	2.833333	3.066667
	Import and export content material mechanism	3.1	3.333333
	Possibility to share and reuse learning material	3	3.1
	The ability to adopt course and other resources into learning environment and learner	2.966667	3.066667

VARIABLES	INDICATORS	COURSERA	edX
Activity	Feature to generate learning statistic report	2.9	3.433333
	Process to do task, quiz, test	3	3.166667
	Use learning video	2.966667	3
	Use learning material (text, slide)	2.9	3
Support	Forum to support learners to share experience and to discuss to each other participants	2.8	3.1
	Chatting features which directly support learner and instructor to share experience	3.066667	2.9
	Electronic whiteboard which used by instructor and learner virtually and other synchronize service, such as sharing, group browsing, and voice chat	2.866667	3.1
	Instructor and learner can send email to support communication easily	2.833333	3.1
	Video features enable instructor to do streaming from internal system or live video conference between instructor and learner or both learner	2.233333	3.133333
	Calendar learning activity	2.833333	2.733333

VARIABLES	INDICATORS	COURSERA	edX
	Feature to support searching by keyword	2.833333	2.3
	Bookmarking to a specific course	2.5	2.4
	Tracking to learning result	2.766667	2.4
	Authorization and authentication into the application	2.533333	2.566667
	Registration for a new member	2.5	2.533333
	Learners can assess or give rating	2.8	2.666667
Evaluation	Learners can do self-assessment to monitor their improvement	2.866667	2.5
	Assessment to peer participants to give feedback of the improvement of the participants	2.466667	2.533333
	Assessment from instructor about learning result	2.566667	2.766667
	Provide assessment result	2.466667	2.633333
	Generate certification	2.4	2.633333

Learning Activity

Learning activity is to stimulate learning experiences. The combination of learning activities can accomplish learning objective. Generally, we need three types of learning activities, which are: Absorb, Do, and Connect. In the absorb activity, the learner is mentally active by reading literature, watching a video, or listening to narration. Another type of learning activity is Do something with what they have absorbed, such as practice, simulation, play a game, or answer a quiz. The last type of learning activity is Connect what they get in the learning process into their work, lives, or the prior learning [16].

In this study, we try to map every element of learning activity into edX and Coursera activities. The result in Table 4 shows that learning activity measurement for edX and Coursera have fulfilled learning activity qualification, it can be seen in interval values for both platforms that achieved above 2.5

TABLE IV. LEARNING ACTIVITY MEASUREMENT

VARIABLES	INDICATORS	COURSERA	edX
ABSORB	Access reading material (text, slide)	2.5	2.5
	Access video learning	2.566667	2.5
	Access to wiki	2.433333	2.533333
	Supporting activity using apps	2.633333	2.5
DO	Access to learning assignment	2.7	2.833333
	Access online test	3.233333	2.833333
	Access to *video quiz*	3.033333	2.633333
	Access to *virtual laboratory*	3.033333	2.933333
	Access to *wiki edits*	2.9	2.766667
CONNECT	Discussion in the forum	3.133333	2.866667
	Communication using email	2.8	3.133333
	Face to face study meetups	2.966667	3.133333

T-Test Measurement

After we check interval values of each component of RASE pedagogical model and learning activity between edX and Coursera platform, then we do measurement use t-test analysis to check is there any differences between edX and Coursera platform in term of RASE pedagogical model and learning activity components. To prove this research question, we identify the hypotheses to conduct this analysis. Those hypotheses are

H_{0a}: The functionality of Resource between edX and Coursera alike

H_{1a}: The functionality of Resource between edX and Coursera is different

H_{0b}: The functionality of Activity between edX and Coursera alike

H_{1b}: The functionality of Activity between edX and Coursera is different

H_{0c}: The functionality of Support between edX and Coursera alike

H_{1c}: The functionality of Support between edX and Coursera is different

H_{0d}: The functionality of Evaluation between edX and Coursera alike

H_{1d}: The functionality of Evaluation between edX and Coursera is different

H_{0e}: The functionality of Absorb between edX and Coursera alike

H_{1e}: The functionality of Absorb between edX and Coursera is different

H_{0f}: The functionality of Do between edX and Coursera alike

H_{1f}: The functionality of Do between edX and Coursera is different

H_{0g}: The functionality of Connect between edX and Coursera alike

H_{1g}: The functionality of Connect between edX and Coursera is different

Table 5 shows the significance values for variables Resource, Support, Evaluation, Absorb, Do, and Connect that have values above 0.05. It can be concluded that edX and Coursera have similar components features for Resource, Support, Evaluation, Absorb, Do, and Connect. However, Activity component shows that the significance value has below 0.05, it means Activity components of edX and Coursera have different activity to support the learning platform.

TABLE V. T-TEST MEASUREMENT

Variable	Platform	Mean	Std Dev	SEM	F	Sig	t	df	Sig (2-tailed)	95% Confidence Interval of the Difference	
										Lower	Upper
Resource (a)	edX	3.1417	0.35162	0.0642	1.606	0.210	1.673	58	0.100	-0.3269	0.46602
	Coursera	2.9750	0.41704	0.07614			1.673	56.389	0.100	-0.03281	0.36614
Activity (b)	edX	3.15	0.34491	0.06297	7.237	0.009	1.893	58	0.63	-0.01194	0.42861
	Coursera	2.9417	0.49429	0.09024			1.893	51.829	0.64	-0.0125	0.42917
Support (c)	edX	2.9444	0.24792	0.04526	0.132	0.718	-0.041	58	0.967	-0.13680	0.13125
	Coursera	2.9472	0.27024	0.04934			-0.041	57.574	0.967	-0.13682	0.13127
Evaluation (d)	edX	2.5333	0.45888	0.08378	0.122	0.728	0.215	58	0.831	-0.22218	0.27551
	Coursera	2.5067	0.50305	0.09184			0.215	57.517	0.831	-0.22218	0.27556
Absorb (e)	edX	2.5133	0.64259	0.11732	2.055	0.157	-0.705	58	0.484	-0.40958	0.19625
	Coursera	2.6200	0.52352	0.09558			-0.705	55.724	0.484	-0.40984	0.19651

Variable	Platform	Mean	Std Dev	SEM	F	Sig	t	df	Sig (2-tailed)	95% Confidence Interval of the Difference	
										Lower	Upper
Do (f)	edX	2.6083	0.61126	0.1116	0.952	0.333	0.116	58	0.908	-0.27042	0.30376
	Coursera	2.5917	0.49342	0.09009			0.116	55.529	0.908	-0.27070	0.30403
Connect (g)	edX	2.7222	0.59425	0.10849	0.19	0.664	0.578	58	0.565	-0.21869	0.39646
	Coursera	2.6333	0.59596	0.10881			0.578	58	0.565	-0.21869	0.39646

CONCLUSION

Based on the RASE model and the concept of e-learning activity (Do, Absorb, Connect), it can be concluded that those features contained in edX and Coursera have similar functions and activities of the learner's perspectives. In fact, many institutions have used these platforms to support learning activities in higher education institution. The comparison of the components using RASE pedagogy (Resource, Activity, Support, Evaluation) with the operational activities carried out in online learning have the fact that most of the characteristics of these platforms do not have a significant difference between edX and Coursera in term of measurement in the RASE components interval.

However, for the support component, the function of the video service in Coursera shows that the satisfaction rate is still below the average, reaching 2.23. While in the characteristics of edX, bookmark and tracking features also show a number below the average that is 2.4. In the evaluation component, a peer evaluation to provide feedback on the progress of participants, the results of the evaluation and the certificate characteristic generated for Coursera show that the value is still below average level satisfaction, that is, the evaluation between peers and the results of the evaluation obtained a score of 2.467. While the features of generates certificate obtain average value of 2.4. The conclusion can improve performance of Support and Evaluation features.

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