

An Evaluation of Students' Perception on MOOC Instructional Design Elements

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ABSTRACT

MOOC is one of the rapidly growing online learning platforms. As reported up until April 2016, there are more than a total of 4300 courses which enrolled by more than 35 million students all over the world. In order to measure the effectiveness and efficiency of the MOOC implementation in supporting the teaching and learning process, the learners' perception must be evaluated. Thus, the purpose of this study is to identify the relationship between students' perception and MOOC. We conducted a student-centered pilot experiment to assess engineering students' perceptions based on the MOOC technical course offered to them. Statistical based analysis approaches are used to analyze the data. This paper presents the results of student's perception based on six rudiments of MOOC instructional design elements model categorized as CI, CR, AL, ML, MC and IN. The results revealed that all six variables contribute positive relationship with intended perception (IP), which reflects that students possess a positive perception when learning through MOOC. The proposed model explained as much as 72.8% of the variance with IP that reflect a good model fit, as well as statistical significant and CI construct is the best predictor of IP which it holds the largest beta coefficient value.

KEYWORDS: Perception, Relationship, MOOC, Technical Course.

INTRODUCTION

Online learning has become one of the fastest growing trends in educational fields. Massive Open Online Courses or MOOC is one of the most rapidly growing online educational based learning. Basically, the main purpose of online learning is to offer its learners an access to education materials at their own pace and time as well as lowering the average educational learning cost. MOOC as stated by [1] is a tuition-free course taught over the internet which allows virtually anyone to attend the course. As reported by Class Central up until April 2016, there are more than a total of 4300 courses being offer, which enrolled by more than 35 million students and adopted by more than 500 universities all over the world and it is expected that number to more than double in 2016 [2]. The courses offered cover all the fields which can be categorize into technical courses; technical and business courses; and non-technical courses; humanities and social science courses.

Recent trends in MOOCs have led to a proliferation of studies which discuss about their framework, pedagogy and course structure which the key factors is to promote online learning effectiveness and able to engage the learners with the learning process [1, 3-5]. Thus, this study scope is to identify the students' perception on MOOC implementation in one of Malaysia technical university. In this study, we only interested to highlight the relationship between student's perception (will be used as intended perception or IP) based on six rudiments of MOOC instructional design elements model categorized as course information (CI), course resource (CR), active learning (AL), monitoring of learning (ML), meaningful connection (MC) and interaction (IN). We conducted a student-centered pilot experiment to assess engineering students' perceptions on the MOOC technical course offered to them. Correlation analysis and multiple regression analysis approaches are used to analyze the gathered data.

Research Objective

The purpose of this quantitative study was to identify the relationship, prediction and the best predictor between students' perception and MOOC technical course based on MOOC instructional design elements.

Research Question

The main highlight research questions that guided this study are as follow:

Research question 1: What is the relationship between students' intended perception (IP) with six variables of instructional design elements?

Research question 2: How well do the six variables of instructional design elements predict students' perception on MOOC? How much variance in perception can be explained by scores on these six variables?

Research question 3: What is the best predictor of perception: course information (CI), course resource (CR), active learning (AL), monitoring of learning (ML), meaningful connection (MC) or interaction (IN)?

RELATED RESEARCH

In producing and supporting knowledgeable society, the community must be encouraged to practice lifelong learning. One of the platforms that able to support the lifelong learning is through online learning [6]. Using this platform, learning can be conducted at anytime and anywhere which depends on the learner's preferences. This is because most of current students or learners are knowledge seeker and also an independent learner who knows and uses many skills, strategies, resources, systems and networks to help themselves to find and use information effectively [7]. Due to this reasons, the used of online learning as one of the highly accessible and most effective delivery methods have becoming increasingly widespread. A part from this, few questions has been raised up: How do students perceive online learning? What factors can influence the student's perception? Which online instruction methods do students prefer?

In [8]reported in their study on students' perception through the use of online language learning materials to support the teaching and learning activities: when asked about the student's opinion on online learning as much as 62.9% find that the online learning as very helpful, 14.4% rated as very interesting, 12.4% found online learning as not interesting at all and remaining 10.3% found online learning as not helpful. This reflect that majority of the students holds a positive perception about online learning. Moreover, in[9]surveyed 78 students in online courses over four semester at Miami University to determine the students' perception of the effectiveness, usefulness and quality of the exercise/activities of the online computational-experimental (ComEx) learning modules offered to them. The results of the survey revealed that majority of the students agreed that ComEx exercise/activities improving their understanding of the processes approaches related to the learning content, improving their skills in using computational tools, strengthening their interest in the content of the learning and promoting learning and applying new computational and experimental concepts. These replicate positive students' experiences from using the online module.

In [10] reported that online forum activities are among one of the factors, which can influence towards positive learners perception in MOOC and this can also address the high dropout issues in MOOC. The study summarized that online forum indeed plays an important role in motivating learner continuance, in that those who visited the forum completed more assignments. Besides, among the different types of forum activities including visiting, posting, interaction with peers and interaction with instructors, learners find that interaction with instructors emerge as an important factor contributing to more assignment completions in addition to forum posting.

Besides forum, another interesting study in MOOC is related to the video production. Video is one of the most important resources for online learning either it serve as a lecture video or non-lecture video in engaging and influencing positive students' perception with learning[11-13]. Further explored on the impact of video production in online learning, in[13] had further investigate using data from 6.9 million video watching sessions across four MOOC courses offered by edX MOOC platform which is the largest-scale study of video production and learning engagement. Their findings provide us with a number of important video production elements which are shorter videos, informal talking-head videos and Khan-style tablet drawings videos able to motivate and engage students more with the learning thus able to create a positive perception among the students with the online learning.

The study by [14]offers probably another comprehensive empirical analysis, which surveyed 186 students on discovering most effective student engagement activities and interaction channels using online learning platform. The author determined that there is no particular activity that will automatically help students to be more motivated and engaged in online classes. However, the results also suggest that multiple communication channels may be related to higher engagement and that student-student and instructor-student communication are clearly strongly correlated with higher student engagement with the course, in general. Thus, advice for online instructors is still to use active learning but to be sure to incorporate meaningful and multiple ways of interacting with students and encouraging/requiring students to interact with each other.

Based on the presented researches above, studies repeatedly highlight that student perceptions are an important determinant towards motivating and engaging students with the learning process. Thus, an understanding of these perceptions can be contributed towards the student growth and achievement, provide a reflection on the effectiveness of teaching and learning process and also can promote further improvement towards the success implementation of online learning.

METHODOLOGY

A quantitative based method was chosen as the blue print in this study which focuses on exploratory research. Online questionnaire type is used as the main data collection method. This section explains on the sample chosen, data collection procedures and survey instruments.

Participants and Data Collection

The methodology used for this study was descriptive analysis approach. We conducted a student-centered pilot experiment to assess engineering students' perceptions based on the MOOC course offered to them. Online questionnaires were used to collect quantitative data for the study and multiple regression analysis is used to analyze the data collected. There are a total of 43 engineering students who currently in their second year of study. The majority of the participants (72%) were male and remaining 28% are female.

The data collection involved three major phases. First, the respondents were asked to experience the used of Open Learning platform (MOOC) by the respective lecturer during the lecture hours. Seconds, they were asked to enrol into required MOOC course and participate in it for three weeks: watching videos, answering online quizzes, posting responses to forums and communicating with other members. Third, the respondents were asked to critically evaluate the MOOC course effectiveness based on specific criteria being set using the online questionnaire platform.

Instruments

As mentioned earlier, the online survey approach was designed to gather information based on MOOC course effectiveness based on instructional design elements. The questionnaire were design based on a model of engaging online students organized around self-determination theory (SDT) and MOOC instructional design elements as per suggested by [1]. The main structure of for the MOOC instructional design elements were combination from four different online learning policy documents prepared by professional online learning councils from all over the world with two most highly-rated MOOCs offered by Coursera. The respective four councils are: 1) Benchmark for Technology Supported Teaching and Learning from Australia; 2) Interregional Guidelines for the Evaluation of Distance Education Programs (Online Learning) from USA; 3) Open and Distance Learning Quality Council Standards from UK; 4) Guidelines for the Implementation of Effective E-learning Courses based on Collaboration from Italy, France, Germany and Finland. The respective two most highly-rated MOOCs are “An Introduction to Interactive Programming in Python” and “Epidemics-the Dynamics of Infectious Diseases”.

The final model of engaging students in online learning courses as per proposed by [1] is based on six instructional design elements which are course information, course resources, interaction, active learning, frequent monitoring of learning and making meaningful connections. For the purpose of this study, the element of Intended Perception (IP) was then added into the model where the variable was to analyze the student’s perception on MOOC course. Figure 1 illustrates the overview of the model used in this study. Table 1 listed the questionnaire instrument used for this study.

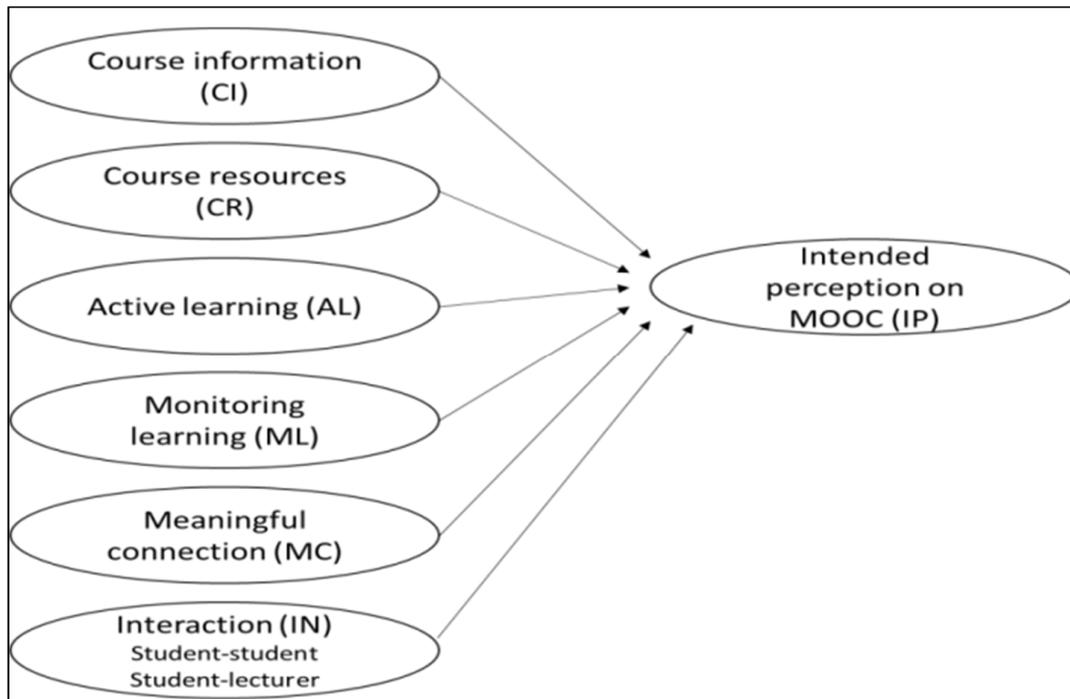


Figure 1: A model of MOOC instructional design elements

Table 1: Questionnaire instrument items

Construct	Item Code	Item
Course Information	CI1-CI4:	The following information are clearly stated and understandable: [Course objectives; Course duration; Course syllabus; Course requirement (type of assessment, criteria for earning badges, activities deadline)]
	CI5:	The overall course information suits my learning pace
Course resources	CR1:	The following information is about the course materials resources: I engage more with lecture videos to understand better
	CR2:	I engage more with lab tutorial videos to understand better
	CR3:	I engage more with real case study videos to understand better
	CR4:	I engage more with lecture slides to understand better
	CR5:	The course materials provided are understandable
	CR6:	The course materials provided able to meet my learning needs
	CR7:	The following information is about the course activities resources: I engage more with quizzes to understand better
	CR8:	I engage more with self-assessment to understand better
	CR9:	I engage more with group discussion to understand better
	CR10:	The course activities provided are understandable
	CR11:	The course activities provided able to meet my learning needs
Active Learning	AL1:	I find that self-assessment activities are enjoyable
	AL2:	I feel enjoy to answer quizzes and get badges
	AL3:	I find that group discussion activity allow me to participate actively
	AL4:	I find that badges given able to increase my motivation to complete each of the activities
Monitoring Learning	ML1:	Weekly quizzes given helped me to achieve the learning objectives
	ML2:	Assignments given helped me to understand better the learning objectives
	ML3:	I find that "Activity Completion" feature helped me to keep track on my learning progress]
Meaningful Connection	MC1-MC5:	The following course materials (e-content) are useful for my learning: [a) Lecture video; b) Lab tutorial videos; c) Real case study video; d) Interactive lecture slide; e) Interactive extra reading materials]
	MC6-MC10:	The following course activities (e-activities) are useful for my learning: [a) Quizzes; b) Self-assessment question; c) Interactive online activity; d) Lab exercises; e) Group discussion activity]
Interaction	IN1:	Opportunity to interact with large number of students is beneficial for my learning
	IN2:	Group-base discussion is useful for my learning
	IN3:	I find it comfortable to communicate with lecturer via forum
	IN4:	I find it much easier to communicate with lecturer via forum
	IN5:	I find it comfortable to communicate with friends via forum
	IN6:	I find it much easier to communicate with friends via forum
	IN7:	Learning using MOOC allows personalization (student can interact one-to-one with the instructor)
Intended Perception	IP1:	I intend to use MOOC platform to study other courses in the next semesters.
	IP2:	I predict I will use MOOC platform to study other courses in the next semesters.
	IP3:	I have a plan to use MOOC platform to study other courses in the near future.

RESULTS AND DISCUSSION

This section presents all the results and findings gather from the data analysis. The data was analysed using SPSS. In this study, the analyses of the data are based on reliability test results, correlation analysis results and multiple regression analysis results.

Reliability Test

To ensure the reliability of the constructs used to measure the students' perception on MOOC used in this study, reliability test has been conducted. Finding from the Cronbach's Alpha value reflected that all variables are acceptable (values above 0.70). Table 2 presents the Cronbach Alpha value for each of the construct and total number of items per each construct.

Table 2: Cronbach's Alpha value for each of the construct

Components	Cronbach's Alpha	N of Items
Course information (CI)	0.945	5
Course resources (CR)	0.957	9
Active learning (AL)	0.986	4
Monitoring learning (ML)	0.968	3
Meaningful connection (MC)	0.950	7
Interaction (IN)	0.823	7
Intended perception (IP)	0.935	3

Correlation Analysis

The main objective in this study is to discover the relationships factors. There are several statistical analyses that can be used in exploring relationship among variables such as correlation analysis, regression analysis and factor analysis. However, the one that best suits this study is correlation analysis. Correlation analysis is used to explain the strength and the direction of the linear relationship between two variables [15]. Therefore, in this study, we tried to identify the positive or negative relationship between six variables of instructional design elements with the students’ perception on MOOC or intended perception. The correlation analysis revealed that all six instruments of instructional design elements draw a positive direction of the relationship with intended perception. Besides, there is a large correlation between CI, CR and AL variables (r value above 0.05) with intended perception. This also reflect that strong (positive) relationship between CI, CR and AL with intended perception (0.827, 0.974 and 0.516 respectively). While MC and IN holds 0.475 and 0.412 respectively of the size value of the correlation coefficient, which reflect a medium correlation (r value between 0.30 and 0.49) and drew a moderate (positive) relationship with intended perception. On the other hand, ML holds a small coefficient (r value 0.10 to 0.20) [16] or weak (positive) relationship with intended perception with value 0.218.

From correlation analysis, it can be concluded that an adequate course information do influence positive perception of students on the MOOC course. Besides, engaging MOOC course resources also bring a positive perception of students and active learning strategies included in the MOOC course do influence positive perception of students. Moreover, effective monitoring of learning over the MOOC course and implementation of meaningful connection do bring positive perception of students. The interactions among students and student and student with educators do effect the positive perception of students on the MOOC course. Table 3 presents an overview of means, standard deviation and inter-correlations for perception and six elements of MOOC instructional design.

Table 3: Means, standard deviation and inter-correlations for perception and independent variables (N = 36)

Variable	M	SD	CI	CR	AL	ML	MC	IN
Intended perception (IP)	13.94	1.35	0.827**	0.974**	0.516**	0.218	0.475**	0.412*
Independent Variable								
1. Course information (CI)	22.06	3.22	-	0.877**	0.460**	0.466**	0.479**	0.495**
2. Course resources (CR)	41.97	3.67		-	0.543**	0.218	0.518**	0.437**
3. Active learning (AL)	17.00	2.54			-	0.248	0.080	0.100
4. Monitoring learning (ML)	13.83	1.81				-	0.492**	0.520**
5. Meaningful connection (MC)	32.89	2.80					-	0.745**
6. Interaction (IN)	30.97	3.03						-

**p < 0.001 (2-tailed).

Multiple Regression Analysis

After conducted the correlation analysis between six independent variables (IV) which are CI, CR, AL, ML, MC and IN; and one dependent variable which is intended perception (IP), two variables (CR and MC) has been deleted due to the high correlation value between the independences variables (more than 0.7) which is 0.877 and 0.745 respectively[17]. High in multicollinearity can increase the variance of the coefficient value of a variable and make the value very sensitive to minor changes of our model. The result is that the coefficient value is unstable and difficult to interpret especially when conducting multiple regression analysis[18]. The other variables; CI-IP, AL-IP, ML-IP and IN-IP are correlated substantially and has been retained. Tolerance value and variance inflation factor (VIF) value are also other important factors in checking the multicollinearity. In this study, the tolerance value for each of the independent variables CI, AL, ML and IN are above the commonly used cut-off points; less than 0.10 (0.561, 0.757, 0.663 and 0.624 respectively). Next, the VIF values for each of the independent variables CI, AL, ML and IN are below the commonly used cut-off points (above 10) (1.781, 1.322, 1.508 and 1.603 respectively). Thus, the remaining four variables have been retained for next analysis.

Next, we want to explore is how much variance in perception can be explained by the remaining four variables which are CI, AL, ML and IN. For this, we based on the adjustable R square value. This value used to explained how much of the variance in the intended perception variables can be explained by the model (which includes the variables of CI, AL, ML and IN). In the study, the model (which includes the variables of CI, AL, ML and IN) explained as much as 72.8% of the variance based on the adjusted value in intended perception, which reflect a good model fit, as well as statistical significant (0.000; p< 0.0005). The construct CI holds the largest beta coefficient value 0.790 which makes the strongest unique contribution in explaining the dependent variable. The second largest beta value -0.276 holds by ML, followed by construct AL (0.207) and IN (0.144),

indicating that these variables made less contribution in explaining the intended perception. Moreover, from the analysis only CI, ML and AL constructs made a unique and statistically significant contribution to the prediction of intended perception scores (sig. value less than 0.05)[17].

CONCLUSION

This paper presents the relationship of students' perception on MOOC instructional design elements. Based on the findings, adequate course information about the MOOC course, engaging MOOC course resources and active learning strategies included in the MOOC course able to lead towards positive perception of students. In addition, effective monitoring of learning over the MOOC, meaningful connection implemented in MOOC and two ways interactions (student-student, student-lecturer) in MOOC also another important aspects that able to lead towards positive perception of students in learning. The correlation analysis results revealed that all six variables contribute positive relationship with intended perception, which reflects that students possess a positive perception when learning through MOOC. Next, from multiple regression analysis the results discovered that the final model (which includes the variables of CI, AL, ML and IN) explained as much as 72.8% of the variance based on the adjusted value with IP, which reflect a good model fit, as well as statistical significant (0.000; $p < 0.0005$). In addition, the last analysis also highlighted that Course Information (CI) construct is the best predictor of intended perception as it holds the largest beta coefficient value 0.790 which makes the strongest unique contribution in explaining the dependent variable.

A part from the above interesting findings, after getting advice from the subject matter expert in this area, it proposed the two elements (CR and MC) which has been removed due to high in multicollinearity, must be retained but with several amendment with the questions. This is because CR and MC are two important variables that must be included when we want to measure student engagement with MOOC (our next prospect of research).

IMPLICATION AND FUTURE WORKS

Understanding the relationship of students' perception with learning through MOOC is only the starting platform to further develop more effective and efficient teaching and learning planning guideline. By introducing MOOC as one of the option that can be used by the community to support lifelong learning, the process to acquire the knowledge and learning can be done continuously. This paper also: i) shares the urgency in identifying the students' perception towards supporting the student growth and achievement, ii) provide a reflection on the effectiveness of teaching and learning process and iii) also can promote further improvement towards the success implementation of online learning initiatives.

For future works, the researchers will further conduct a triangulation process (interview session with students and lecturers) in order to confirm findings from this study. In addition, engagement analysis on each of the MOOC instructional design elements will be further analyze to identify which elements that able to engage more with the students. This finding will be another interesting view which can be explored further.

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