

## Conference Paper

# Effectiveness of Game-Based Learning – Learning in Modern Education

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## Abstract

The experiential learning process is a relevant method used to enhance understanding of the field and the critical thinking skills of learners. Further more, technological developments improve students' learning needs. In this case, learners are required to be able to learn and work dynamically by combining the concept of critical thinking and the way of life as demand for the 21st century. Therefore, dynamic learning and the ability to improve the cognitive and collaborative abilities of learners in their interactions with the environment and all changes are indispensable. This research aims to spread the educational game quiz Assistance to create fun and dynamic learning for students. In addition, developed media is expected to improve cognitive ability and critical thinking learners, especially in higher education. The development of this educational game is done in the economic field so that the material to be presented is a basic course of economics faculty. To measure the success of this game-based learning, researchers used 100 samples from three majors (development economics, management, and accounting). This method of analysis uses the method of gain-scores, where the learning outcomes of experimental Group with learning game treatment and control group learning outcomes are examined and analyzed to determine their effectiveness. Results from analyses showed that use of game-based learning is highly effective for improving learning outcomes.

**Keywords:** Technology, educational game, game based learning, gamification Learning.

## 1. Introduction

The learning process is usually done with face to face in the classroom. Teachers do their job as teachers by conveying information to the students conventionally. The application of methods, strategies, and learning techniques tends to be implemented in the classroom by providing students with treatment and supervision by the teachers concerned. Nevertheless, technological developments have influenced all part of life including education. Chou (2001) suggested that the increasingly available and accessible development of computerized technology by students and educators, the teaching process and lab activities can be carried out through the intranet/ Internet.

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Previously, JARVENPAA and Ives (1996) stated that technological developments could not be avoided from business schools, because new technology did not only affect the world of practitioners but also the educational world (Bell et al. 2001). Therefore, the learning process by utilizing information technology is an important choice as it can bridging the transfer of costs, information, and experts (developers and educators) with many alternatives/ ways when Provide an additional opportunity to obtain education (Haghirian and Simon, 2002).

The use of technology is felt very dynamic and significant influence is the use of mobile as a means of learning. Huang and Chiu (2015) evaluated the context-aware mobile learning (CAML) model that had been applied to various fields (Macris, Skoutas, and Skianis, 2012; Coulby, et al., 2011). Research on mobile use as a means of learning has been done mainly in higher education (BAKHSH, Mahmood, and Sangi, 2017; Witt and Gloerfeld, 2017; Al- Emran, Elsherif, and Shaalan, 2016), both of which

emphasize the Internet utilization that has a database that develops very rapidly (Perera, et al., 2013). Mobile utilization on learning is done by the inquiry model (Hwang, et al., 2013), to the use of mobile games in the learning process (Hamari, et al., 2016; Chen and Law, 2015; Ke, Xie, and Xie, 2015) can provide experiential learning and developing student cognitive abilities compared to non-gaming learning (Tsai, 2016; Chang, et al., 2017).

From the discussion above, it is hoped that the combination of game-based learning with teaching skills in creating active and enjoyable learning can foster the interest and motivation of students in learning or using their gadgets as Learning media while socializing with friends with its virtual media. It is this condition that makes researchers want to test the effectiveness and efficiency of games as a learning medium for students and general.

## 2. Method

In this case, ECrowd War was developed based on three categories of interactions by Moore (1993), namely (1) The interaction of learning and content/media, (2) The interaction of teachers and learners, and (3) Interaction of study and learning. Furthermore, each of these stages will be tested for the effectiveness of their application on learning in the classroom which will be analyzed by experimental methods. The research was conducted on the students of the Development economics department, Economics Faculty, Universitas Negeri Malang (UM), as respondents for the analysis came from 4 classes consisting of 40 student group experiments and 40 Student control group.

Of these four classes, two classes are used as a control class without the use of e-crowdwar learning. Two classes, for experimental class with treatment of E-crowdwar use in learning. To analyze the effectiveness of the ECrowdWar prototype application, carried out analysis of pre-test results and post-test.

TABLE 1: Desain Penelitian.

Variable X	Pembelajaran dengan ecrowd war (X1)	Pembelajaran konvensional (X2)
Variable Y	Hasil belajar (Y)	Hasil Belajar (Y)

Source: Researcher

The focus of this research is to develop the expertise of students needed by the 21st century on the macroeconomic course, microeconomics, and the application of the ECrowd War prototype as a learning medium, and the validation of the prototype. The Data collected is tailored to the needs of each research stage. The pre-Test stage requires the result of learning the student group experiment and control group before using game- based learning. At the post-test stage, we observed student learning outcomes after using game-based learning and students who did not use game-based learning.

### 3. Result and Discussion

At the first stage, the lecturer gave a pre test on macro and micro-economic knowledge to the entire group (experimentation and control). The results of the pre test are known

TABLE 2: Descriptive Statistic of Control Group.

Descriptive Statistics					
	N	Min.	Max.	Mean	Std. Deviation
Pre_test	40	37.00	67.00	53.10	7.27
Post_test	40	67.00	97.00	79.05	6.36
Valid N (listwise)	40				

Source: researcher

Data indicates that the student control group has an initial preliminary study result of 53.10 and increased to 79.05 at post-Test without class action. With a minimum score of 37 and a maximum score of 67 on pre-Test. In a post-Test session, student learning scores increased to a minimum of 67 and a maximum score of 97.

When compared to student development of the experimental group with the application of learning based games, it has a preliminary study result of 50.87 and an increase

to 85.87. The change in the minimum-maximum value of an experiment class is also quite significant. Where the minimum score is 34 and the maximum score is 73 on pre-Test. After treatment score student studies increased to a minimum of 64 and a maximum score of 97. With the following data below,

TABLE 3: Descriptive Statistic Experiment Group.

Descriptive Statistics					
	N	Min.	Max.	Mean	Std. Deviation
Pre_test	40	34.00	73.00	50.87	9.58
Post_test	40	64.00	97.00	85.87	8.54
Valid N (listwise)	40				

Source: Researcher

After doing the descriptive data testing, it is necessary to test the Gain score to find out the effectiveness of game-based learning. After doing the test N-Gain score can be known that,

TABLE 4: Gain Score Test.

Descriptives			
Group		Statistic	Std. Error
Control_Group	Mean	55.3062	1.98557
	Median	53.3333	
	Minimum	30.77	
	Maximum	92.31	
	Std. deviation	12,56	
	df	39	
	Sig.(2 Tailed)	0,00	
Experiment_Group	Mean	69.8814	3.12694
	Median	70.9596	
	Minimum	37.69	
	Maximum	94.74	
	Std. deviation	19,78	
	df	39	
	Sig.(2 Tailed)	0,00	

Source: researcher

The results of the analysis showed that the average score of N-Gain-score Group Experiment (game- based learning) amounted to 69.88 or 69.88%, these results included in the Gain-score category are quite effective. With N-Gain score at least 37.69 and a maximum score of 94.74.

Compared to the control group (without class treatment), it shows that the average score of N-Gain-score is 55.31 or 55.32% with a less effective N-Gain-Socre value criterion (Hakker, R. R, 1999). The group control has a minimum score of 30.77 and a maximum of 92.31. With that comparison, we can conclude that the use of a game-based learning model is effective enough to improve student learning outcomes. Meanwhile, the use of conventional methods is effective to improve student learning outcomes in microeconomic and macro subjects.

### 3.1. Independent t Test for N-Gain score

To compare the effectiveness of the use of game-based learning with conventional learning methods, researchers use test independent sample T Test with the following results,

TABLE 5: Independen Sample t Test.

Independen Sample t Test						
Levene's Test for Equality of Variances						
		F	Sig.	t	df	Sig. (2-tailed)
NGain_Percent	Equal variances assumed	4.09	.087	-3.94	78	.00
	Equal variances not assumed			-3.94	66.05	.00

Source: researcher

Referring to the table independent samples Test is known that the value of significance (SIG.) in Levene's test is  $0.087 > 0.05$  then it can be concluded that the data variation N-Gain Group of Experiments and control group is homogeneous data. As for measuring the difference in effectiveness of the use of game-based learning and conventional methods can be explained by the result of significance calculation (sig. 2-tailed) is  $0.00 < 0.05$ , thus it can be concluded that there is Significant effectiveness differences between the use of a game-based learning method with conventional methods of enhancing student learning outcomes.

## 4. Conclusion

Game-based learning is a learning that adapts to student interests and conditions today. It can be known together that the outcome of game-based learning has a significant impact on the student learning outcomes of the UM Faculty of Economics. The results

of this article have limitations in the observation area, social condition of students, and the level of availability of learning tools based on games. Good may be for subsequent research to include such limitations in research as an additional variable in observation.

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