

# *Effect of Game-Based Learning on Students' Performance in Economics: A Case of "L-AKAD para sa Pilipino"*

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**Abstract**—There is a growing literature on the positive effects of educational games in the classroom settings. Foreign researchers in different countries have increasingly published game-based learning researches in science journals. The important aspect of educational games in the enhancement of students' learning performance in college who participated in the game "Larong Akademiko (L-Akad) para sa Pilipino", a quiz-bee on a board, is the main purpose of this study. The acceptability and effectiveness of the card game as it is integrated into Economics learning is then gauged. A one-group pretest-posttest design was used with the 60 third year education students majoring in Social Studies in Pangasinan, Philippines. The students showed a high level of acceptability of the educational game in learning Economics. Results also showed the effectiveness of the educational game in improving the students' knowledge on microeconomics and macroeconomics.

**Keywords**—Educational board game, Pangasinan State University, Larong Akademiko

## I. INTRODUCTION

Learning by doing is a way of shaping better students' learning. This was the constructionism view of Papert and Harel (1991) who observed how soap-sculpture and lego were used in math class, has set the stage for the evolution of constructionism. Students' mind are freed from the rigor of lectures or instructionism in the classroom. The use of board games just like playing lego free the mind and provides advantages to children. Dewar mentioned the obvious benefits of board games, and these are enjoyment and family bonding.

More and more educators, mathematicians and social scientists are adding literature on the importance of game-based learning in the academe. Liu and Chen (2013) cited the study of Hwang and Wu (2012) who reviewed published articles from 2001-2010 in seven major SSCI journals associated with technology and learning. It was learned that the United States of America had published 30 articles, the Taiwan had 22 articles, and the United Kingdom had published 20 articles.

Board games, as playing and educational tools, provides learning various skills among children. There's a game that test aptitude skills (Lorenzen and Chang, 2006), teach deductive logic (Neller, et.al.,

2006), teach to recognize and remember certain configurations (Gobet and Campitelli, 2006), improve critical thinking skills (Wood and Stewart, 1987), to teach propositional logic and computer programming (Neller, et. al, 2006), to teach financial principles (Shaklin and Ehlen, 2007), to enhance verbal skills.

Scholz, et.al. (2008) researched on the effect of chess as a mathematics lesson given for an hour per week to students with learning disabilities. A test aimed at measuring the respondents' concentration and calculation abilities were administered at the beginning and at the end of the year. It was found out that the calculation abilities for counting and simple addition tasks improved for those students who received an hour of chess lesson per week.

Dewar, states the obvious benefits of board games for kids in his article. Kids enjoy playing board games and these are opportunities for families to play together.

Board game is not only educational, but keeps the society in order as well. Brown who investigated cases of murderers found out in his research that a common thread to killers' stories was the lack of play in childhood. His finding showed a strong correlation between success and playful activity of the thousands of people he had interviewed.

Back in the academe, a significant increase of knowledge on four different areas of math was recorded in the study conducted by Siegler and Ramani (2008) among 124 preschoolers. Their respondents played a board game for 15-20 minutes per sitting within two weeks. Siegler and Ramani (2008) had even assumed that children from low-income households who had lesser opportunities to play number games in their childhood might resulted to their lack of skills in the use of numbers.

Jimenez-Silva, et.al (2010), aimed at delivering a math board games as learning tool through multiple schools in order to motivate students learn math in different ways. It was a collaborative project between a higher educational institution and district schools.

Liu and Chen (2013) designed a card game “Conveyance Go”, to determine the effects of the game to the students’ scientific knowledge of transport and energy and their finding showed a significant increase of learning performance among the participating students.

YIen, Hung, et.al. (2011) who explored the influence of applying a game-based learning approach to nutrition education by setting and experimental group who received nutrition education aided with a computer game-based teaching found that computer game-based learning can improve the learning achievements and learning attitudes of students.

Shanklin and Ehlen’s paper used the Monopoly Board Game as an economic simulation exercise to reinforce understanding on financial matters in evaluating management performance. They concluded that the simulation attempted to excite the students about financial accounting process. This method of teaching improved students’ chance of success over other methods they previously used.

Filipinos might have designed board games utilized in class, however very few Filipinos have researched on the use of educational games as learning tools. The effectiveness of the card game designed to enhance the learning performance of students in Economics is what this study hoped to achieve.

## II. METHODOLOGY

A descriptive research was used in determining the acceptability of the educational game developed by the researcher. A five-point Likert-scale was

utilized in the study. T-test was used in analyzing the result of the pre-test and post-test administered by the researcher.

### A. *Research Participants*

Sixty third year students enrolled in Bachelor of Secondary Education majoring Social Studies who were taking up Economics subject served as the respondents in the study.

### B. *Procedure*

With a total duration of 8 hours, the teaching-learning activity in the form of a game was first conducted during the 37<sup>th</sup> Pangasinan State University Anniversary celebration when students were not required to attend classes. The second time was played for three hours a week after, on the scheduled time agreed by the researcher and respondents. And the third time was held for two hours, another week after. Prior to the game, a pre-test was administered to assess the knowledge of the students in micro and macroeconomics. Thereafter, the group was divided into groups of four and played the first game. Game rules and mechanics were explained and understood by the student-participants.

A post-test, containing same questions as the pre-test, was administered after a week of the third and final game. A questionnaire on the acceptability of the game was also answered by the respondents. Both the post-test and survey questionnaire were done in 60 minutes.

Rani, et.al. (2014) utilizes pre-test and post-test in determining the most appropriate game that can motivate kindergarten students in the learning environment. Students’ attitude and motivation as they’re engaged in two games were considered in the implementation and evaluation of the digital educational design learning environment.

### C. *Design of the educational game L-Akad para sa Pilipino*

A quiz bee on a game board, L-AKAD game might allow students to learn become fully familiarized with the concepts and terms in their area of specialization, while enjoying the presence of their peers or friends. Utilizing Bloom’s Taxonomy, the knowledge to be developed by the game is divided to six cognitive process: 1) remember; 2) understand; 3) apply; 4) analyze; 5) evaluate; and 6) create. These six cognitive process can be classified to the following knowledge dimensions, namely: factual,

conceptual, meta-cognitive, and procedural knowledge.

Topics included in the educational game which utilizes dice, board characters and board games were basic concepts on economics, the role of central bank in the economy, economic growth theories, world renowned economists and world currencies, among others.

*D. Acceptability and learning satisfaction scale*

A five-point Likert scale was employed to measure the level of acceptability of the game in which students answered very highly acceptable (5), highly acceptable (4), acceptable (3), not acceptable (2) and strongly not acceptable (1) based on their perceived acceptability along the four constructs with five statements for each. These constructs are: a) perceived usefulness; b) ease of use; c) attitude towards usage; and d) intention to use.

Such satisfaction scale developed was according to the structure of the technology acceptance model (TAM) to evaluate the degree to which students accepted the educational card game according to four constructs: Perceived usefulness, perceived ease-of-use, attitude towards usage, and intention to use (Davis, Bagozzi, & Warshaw, 1989), as also utilized by Liu and Chen (2013) in their board game, "Conveyance Go".

III. RESULTS AND DISCUSSION

*A. Acceptance of college students towards the educational game*

Mean and standard deviation derived for each construct of the satisfaction scale are presented in Table 1. Positive responses for all the constructs were shown by the students: a) perceived usefulness; b) Ease of use; c) attitude towards usage; and d) intention to use.

Perceived usefulness and attitude toward usage received particularly high scores, indicating that the students very highly agree as they felt that they could master economics concepts by learning with the card game and that it was useful to the their learning of economics concepts. These results also show that game-based learning aroused student interest.

The results in future intention to use and perceived ease-of-use show that the students very highly accept this learning method, felt that it

facilitated learning, and hoped to share it to their friends and utilize it when they become teachers.

TABLE 1. MEAN AND STANDARD DEVIATION OF SCORES IN THE STUDENT SATISFACTION SCALE

Mean	n
Perceived usefulness	4.68
Perceived ease-of-use	4.48
Attitude towards usage	4.60
Perceived intention to use	4.52
n = 60	

*B. Influence of educational card game on economics learning achievement among college students*

A dependent sample t-test was performed using SPSS to examine whether the participants improvement in their learning performance after playing the educational card game. The results indicate that the posttest scores of the students with a mean of 104 and standard deviation (SD) of 35 are significantly higher than the average pretest score of 26 with a SD of 35 as shown in Table 2. According to these results, we can glean that the L-AKAD Pilipino game designed in this study, can assist students in gaining knowledge regarding economics.

TABLE 2. RESULTS OF PAIRED SAMPLE T-TEST ON SCIENCE ASSESSMENT FOR THE BSED SOCIAL STUDIES- MAJOR STUDENTS

	Mean	Standard Deviation	t
Pretest	26.11	10.71	-15.66
Post-test	103.91	35.24	
** p < 0.01 ; n = 60			

IV. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to determine whether the educational game, utilizing a board game aided by cards could assist college students in the acquisition and mastery of knowledge related the economics discipline or subject. The participants showed positive attitudes in playing the game and felt that the approach contributed to their improved learning performance. All the student-respondents very highly accepted this learning method and hoped to share the game to their friends and future students should they become teachers in the future.

Learning with the educational board game could assist them to gain and master concepts on the subject matter used in the game and it aroused their interest

in learning economics. The pretest and posttest results demonstrate that the educational game significantly increased the student's learning performance in economics. Further, the use of the board game to promote game-based learning also enhanced learning motivation and learning effectiveness among the students.

It is therefore suggested that future studies conduct the same research using another subject matter and see the effect of the game. It is therefore recommended that the L-Akad Game should be used as one of the instructional game-based learning material for students in mastering concepts in Economics or any other fields.

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