

Effectiveness of ABG as Instructional Material in Teaching Logic among Filipino Learners

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Abstract

As a learning material, Android-based game [ABG] is a potential tool in the teaching learning process due to the radical change of 21st century learners. This study included developing and validating android-based games as a learning tool for learners in the Philippines.

The research was conducted using the methods of Research and Development (R&D). Particularly mean and standard deviation descriptive statistics were used to analyze the data regarding the validity of the ABG and the feedback from the students.

The t-test was also used to assess the significant difference between pre-test and post-test scores. Findings have shown that the android-based games are accurate in terms of the attribute of education and playability and are therefore good learning materials. Android-based games are likewise a creative learning tool that influences the students ' thinking.

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I. INTRODUCTION

Logic is a philosophical branch concerned with science art and right thought. Helping students understand concepts important to successful argumentation is the main reason for learning logic to advance level. Additionally, today's students need better practical knowledge and skills to pursue higher education, succeed in a technologically focused workforce, and be a well-informed citizen.

Nowadays, however, students find it difficult to deal with concepts, interpretations, ideas, syllogism and even to solve logical problems. This is done by traditional teaching method of spoon feeding. In this case, students ' practical skills need to be improved in a more effective and enjoyable way of teaching, taking into account the behaviors and desires of 21st century learners.

Computer-based game was used by teachers from primary and secondary schools. It has been used for children as well as higher education to promote

learning and teaching. Bespoke science games (Magnussen&Misfeldt, 2004), off - the-shelf historical games (Squire &Barab, 2004), multi-user playing worlds (Barab et al, 2005), training and practice of principles of civil engineering (Ebner&Holzinger, 2006), "a competitive game for teaching programming" (Lawrence, 2004), and "virtual reality games used with students of geography" (Virvou&Katsion, 2004).

The development of computer-based games has increased tremendously as research has shown that the use of games for education is inherently motivating in both adults and children (Grice &Strianese, 2000). Among the impacts and outcomes of games, different studies have shown that games improve information and cognitive skills, motor skills, affective outcry (Garris et al, 2002 and Wouters, 2009). Boyles (2011) gaming also has positive behavioral effects, including highly engaging, sensory and cognitive skills support,

Green and Bavelier (2008), gaming promote learning, behavioral change, and social outcomes.

With the positive effect of computer-based games on learning another gadget that provides different genres of games, so-called android phones were introduced. Since learners have changed radically and need to be motivated in new ways, and most research has shown that game-based learning is an essential tool in teaching math and science, but not in the subject of philosophy, it is therefore necessary to develop effective new learning opportunities and tools to help teach logic in order to bridge the gap between digital learners and their preference.

Therefore, by coining games and learning using mobile platforms, the researchers find it necessary to develop an educational material. Therefore, designing, validating and evaluating the effectiveness of android-based games in learning logic is the main purpose of this study.

II. METHODOLOGY

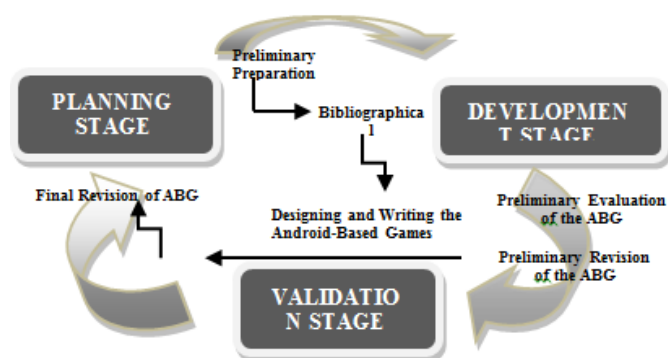


Figure 2. Schematic Diagram showing the steps in the development and validation of Android-Based Games following the R&D Methodology

The 69 Philosophy 11 students responded to the android-based games. Without using the android-based games drill, students were given pre-test. The students were tested in the post-test after using the drill of the android-based games.

The researchers also used the Logic Teachers checklist, the Paper and Pencil Test logic, and

android-based games and student feedback checklist as a tool for data collection.

In general, mean and standard deviation were used for descriptive statistics to analyze the data regarding the validity of the ABG and input from the respondents. Using the ABG Drill, the t-test was used to assess the significant difference between the results.

III. RESULTS AND DISCUSSION

A. VALIDITY OF THE ANDROID-BASED GAMES

ITEM	FREQUENCY
Course	
BTTE 2	46
BSIT 3	23
Version of android Operating System	
Gingerbread 2.3.5	32
Jelly Bean 4.1.2	23
Jelly Bean 4.1.3	14

Table 1. Profile of the respondents including the versions of Android Operating System

The data shows that respondents are using Gingerbread and Jelly Bean versions of the Android Operating System. It means that ABG can be enabled in their devices as they use Android Operating System models.

STATEMENT	MEAN
A. Mentally Change	
The learner discovered new techniques in answering questions	4.72
Activities are performed with time in order to interpret	4.88
how fast the learner to make decisions	
Composite Mean	4.8
B. Emotional Fulfillment	
The learner is required to finish all level in order to answer the Chapter Quiz	4.7
C. Knowledge Enhancement	
The learner performs the task incrementally beginning from level 1 to the last level	4.46
Learners are motivated to get high scores	4.86

as activities level up.

Composite Mean 4.66

D. Thinking Skill and Development

Task require previously acquired knowledge to be applied 4.55

The use of sounds and words encourage the learner to observe and apply perception skills. 4.55

Composite Mean 4.55

E. Bodily Coordination

The learner uses a mouse to select and link answers of questions as quickly as possible. 4.59

OVERALL MEAN 4.664

Table 2. Education Attribute

Teachers ' rating of the android-based logic games has an overall average of 4,664. With this outcome, the academic attribute respondents of the teachers strongly agree that cognitive improvement, emotional satisfaction, skill enhancement, thinking ability and growth, and body coordination occur. It can therefore be concluded that the ABG strongly approved the material and strongly agreed that the ABG is valid method and instructional material among Filipino learners in teaching logic.

STATEMENT	MEAN
A. Game Play	
The game is enjoyable to replay.	4.84
The game drives you to play more rather than quitting	4.59
The games provide clear goals throughout the play	4.84
The game provides scores that motivates the players to finish the game.	4.65
The player's fatigue is minimized by the game's different activities.	4.36
Composite Mean	4.656
B. Mechanics	
The players react according to player actions	4.03
The player able to identify his score/status and goal in the game	4.97
The game's control is consistent and easy to learn	4.52
Instructions are clear and easy to learn	4.22

Composite Mean 4.435

C. Usability

The player can easily register/Log on/Log off 4.62

The player uses menus as part of the game 4.84

The game has stimulating sounds 4.96

The game provides tips/clues/hints during the play 4.96

The game intuitive and easy to learn every game 4.83

The interface of the game is well organized 4.58

The player can easily register/Log on/Log off 4.42

The player uses menus as part of the game 4.41

Composite Mean 4.7025

OVERALL MEAN 4.626

Table 3. Perceived Playability of Android Based Games to Filipino Learners

The respondents ' assessment of the playability attribute has an overall mean of 4,626 with Strongly Agree's descriptive score. The respondents therefore accepted the playability of the games based on android in Logic. The outcome supports Moreno-Ger, et al's analysis (2008). Amoy et al (1999) subsequently classified game elements like logic, memory, visualization and problem solving as the most important elements of the game.

B. EFFECTIVENESS OF THE ANDROID BASED GAMES

Score Scale	Pretest		Posttest	
	Frequency	Percentage	Frequency	Percentage
51-60			9	13.04
41-50			33	47.83
31-40	8	11.59	27	39.13
21-30	29	42.03		
11-20	22	31.88		
1-10	10	14.49		
Total	69	100	69	100

N = 69

Table 4. Distribution of the pretest and posttest scores of the students

Table 4 displays the students' pre-test results and post-test scores. Level 21-30 has the highest frequency in the pre-test scores, followed by level 11-20, scale 1-10 and last scale 31-40. In addition, nobody had a score of 30 and below in the posttest. Which means scores that use the android-based games drill as an intervention in the teaching-learning process increases the students' grades. Huizenga et al (2009) and Burguillo (2010) studies show that games have a significant impact on students' academic performance.

	Logic Test	
	Pre-test	Post-test
Mean	22.13	43.07
Standard Deviation	8.98	6.255
Mean Difference	17.94	
t-value	0.00*	
(two-tailed)		

N= 40

*p < 0.05

Table 5. The t-test of difference between pre-test and post-test mean scores of the students

Checking the value of the difference in the students' pre-test and post-test scores using the t-test was achieved. It appears as a result of the implementation of the android-based games, there has been a significant increase in the logic test. The estimated t-value (0.00) indicates that there is a significant difference between the mean of the pre-test and the mean of the students' post-test score at 0.05 of a two-tailed test's significance. This result means that the android-based games in Philosophy 11 can significantly improve the academic performance of the students. It also shows that android-based learning logic is an effective tool.

These findings suggest that gaming has promoted far more transfer than conventional instruction, encouraged student motivation to learn, improved learning, and games are favourable. [15,16,17]

Abbey (1993), Kafai&Ching (1997), Chen, Shen, Ou& Liu (1998).

Multiple studies provide additional evidence that gaming has promoted far more than conventional instruction, encouraged student motivation to learn, improved learning, and games are favorable regardless of subject matter [18, 19, 20] (Kebritchi et al, 2018, Prensky 2003, Vogel et al 2006).

C. RESPONDENTS PERCEPTIONS THE USE OF ANDROID GAME BASED AS INTERVENTION

STATEMENT	MEAN
(1) The game is enjoyable	4.96
(2) Techniques and rules are easy to understand	4.25
(3) Topics every level are clear and easy to identify	4.7
(4) Topics can replay until you memorized rules and techniques	4.94
(5) Everyone participate in the game	4.94
(6) Easy to answer questions	4.41
(7) Scores are present after the game	4.96
(8) Feedbacks are present (Correct and Wrong) after answering Questions	4.22
(9) Instructions and rules are clear and easy to understand.	4.49
Composite Mean	4.61375
OVERALL MEAN	4.652

Table 6. Mean and Descriptive ratings of the student's feedback

Table 6 displays input from the students with an overall mean of 4,652. This means that in learning logic the students have positive feedback on the Android-based games. It can also be inferred that ABG is an effective learning logic educational product.

As an instructional material, The ABG is an innovative learning tool that positively affects the achievement of the students. This analysis further confirms other studies[21,22,23] and Tüzün. Al (2009); McClarty and others (2012); Moreno and

Mayer (2002). It is also evident that computers have positive feedback between students as revealed in the analysis of [24, 25, 26, 27] Ke 2008, Betz (1995), Pilay et al (1999), Hwang et al (2013)

CONCLUSIONS

1. Android-based games are valid and effective teaching materials in logic teaching and could improve students' academic performance.
2. Android-based games are an innovative learning tool that affects the achievement of the students

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