

## Does gamification improve academic performance?

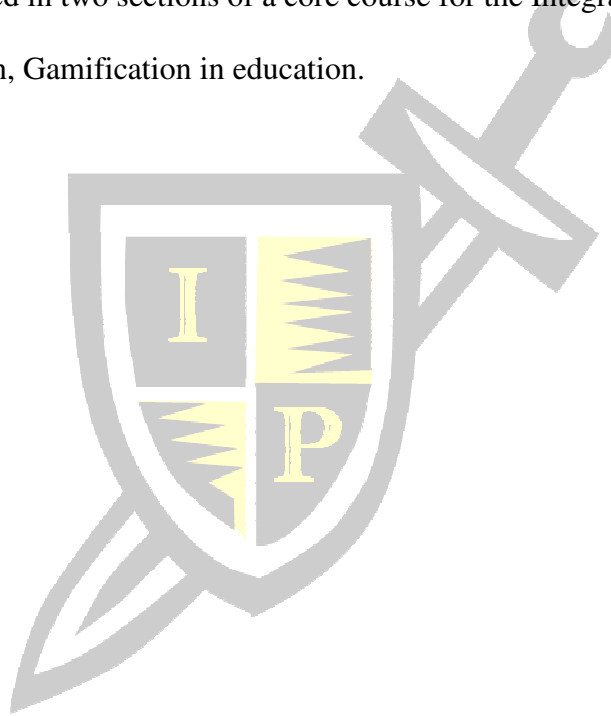
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### ABSTRACT

This study investigates whether there is a difference in academic performance between students who access supplemental material through gamification versus students who do not. The study focuses on students in the College of Business Administration in a large (60,000 students) urban university, enrolled in two sections of a core course for the Integrated Business Program.

Keywords: Gamification, Gamification in education.



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## INTRODUCTION

The paper explores whether there is a difference in academic performance between students at the University of Central Florida (UCF) who had access to additional material through UCF's Materia Widgets platform (i.e. gamification) versus students who did not. UCF uses Canvas as their learning management system. The Center for Distributed Learning (CDL) "serves as the center for online learning at UCF, providing leadership in distance learning policies, strategies and practices" according to its webpage. CDL has a team of developers "dedicated to exploring new technology to enhance teaching and learning at UCF." One of the tools that they designed is Materia. According to the Center for Distributed Learning, "[Materia](#) is designed to supplement traditional web courses with a form of interactive media that we call widgets." These widgets are games created by CDL and customized by the instructor of a course. The widgets can be used within Canvas. Currently UCF has a catalog of 12 games. These are the games in the catalog:

1. Choose Your Own Adventure: Build branching scenarios where your students' choices lead them down different paths.
2. Crossword: A quiz tool that uses words and clues to randomly generate a crossword puzzle.
3. Enigma: Jeopardy-like study and quiz tool. Questions are separated into categorical rows.
4. Flash Cards: A study tool featuring a deck of flashcards.
5. Hangman: Students are provided with a clue and must guess the word or phrase within a certain amount of letters.
6. Labelling: A quiz tool which requires students to correctly identify certain parts of an image by placing labels.
7. Last Chance Cadet: Students must match one set of words or phrases to a corresponding word, phrase, or definition.
8. Matching: Students must match one set of words or phrases to a corresponding word, phrase, or definition.
9. Sequencer: Students must order a random set of words or phrases in the correct order.
10. This or That: Students must answer a question by choosing one of two images.
11. Timeline: A study tool that allows students to visually arrange items in a chronological manner.
12. Word Search: A study tool where students must search a word puzzle for a predetermined set of words.

There are numerous studies delving into Gamification and its benefits. Gamification is the use of games to help faculty members reinforce the material of the class and to try to appeal and connect to a new generation of students that Prensky (2001) calls Digital Natives. These students are able to master computers, the Internet and video games at the same time. The use of games should more easily connect with this new generation of students. In the literature review most articles are supportive of gamification. Looyestyn et al. (2017) found that gamification "is effective in increasing engagement." Buckley, Doyle and Doyle (2017) found that "gamified intervention engaged students because of its novelty and increased student motivation." The Buckley and Doyle (2016) study showed that gamification increase student knowledge of the

subject matter. Haci, Otekin and Kayimbasioglu (2016) show “improvement on the acquisition of knowledge.” Faghili et al. (2014) stated that gamification helps “foster learners’ confidence.”

## **METHOD**

The study was conducted on GEB 4513, Applied Business Technology. This is a three credit hour course that is part of the core curriculum required for an Integrated Business Degree at UCF. The 2016-17 Undergraduate Catalog describes the course as follows: “Focuses on a firm’s ability to recognize, evaluate and integrate technological developments in an advancing tech-driven business environment.”

This study focuses on students in two sections of GEB 4513 during the Spring 2017 semester. The sections were taught by the same instructor. This study asked permission from all students to use their data according to IRB (Institutional Review Board) specifications.

In one of the two sections (Treatment group), 60 students had access to 7 games designed by CDL to help the instructor reinforce the material of the class. The games were: Matching, Flash Cards, Word Search, Crossword, Hangman, This or That and Last Chance Cadet. The games were used as a reinforcement of all the learning objectives of the class. A more detailed example of one of the seven games entitled, Crossword, required students to input the correct term given its provided definition, much like a real crossword puzzle. As the student would populate correct answers, more letter clues would be provided to aid them in solving the entire puzzle. This particular game contained five questions that required students to recall instructional content from the Canvas module. A sample question from the Crossword game was, “2 Across: services that allow you to connect with other people of similar interests and background.” Further investigation found that there were only 31 students (out of the 60) who completed the Crossword game, and of those, several failed to complete it fully. This lack of full participation is probably due to the voluntary nature of the games themselves; there were no course points or other point related incentives offered for students to complete these games in their entirety.

In the other section (Control group), 56 students did not have access to any of the games.

The instructor is the Lead Instructor for the class and designed the entire course. The achievement of students was measured by their final grade in the class. No feedback (either positive or negative) was provided by the students as to whether the games helped or inhibited their overall learning experience.

## **RESULTS**

A t-test was conducted using SAS as our statistical software. The test was a two tailed test. The level of significance used for the test is 0.05. The t-test results provided in the table are dependent on the results of the F test for homogeneity of variances. There wasn’t a significant difference in the scores of these two groups (Table 1). The average final grade for the treatment group was lower ( $M = 80.7$ ,  $SD = 6.7$ ) than the average for the control group ( $M = 82.4$ ,  $SD = 3.6$ ).

## **CONCLUSIONS**

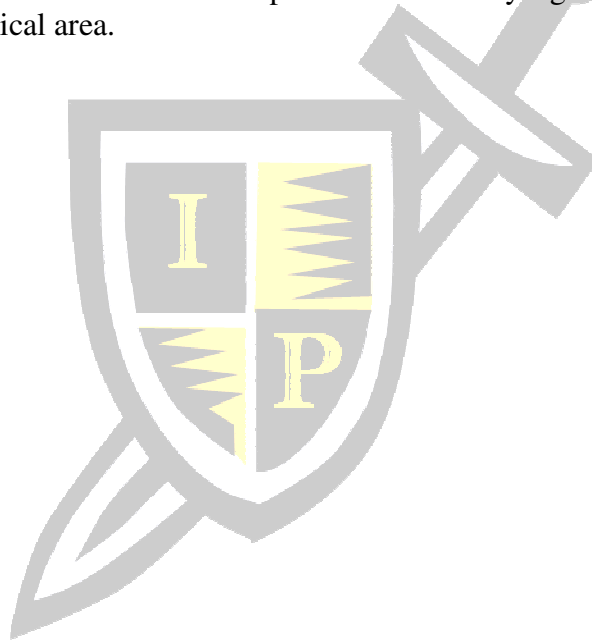
The research seems to support the conclusions reached by Marthi-Parreno, Segui-Mas, D and Segui-Mas, E. (2016). They suggest that even though teachers’ experiences toward

gamification is positive, the performance of students is statistically identical. However, there are contradicting studies that show the opposite result. For example, Yildirim (2017) suggests that student games have a positive impact on student academic achievements.

This study had several limitations; the main limitation being the voluntary nature in which the games were provided. There were no bonus points or other point related incentives for students to participate other than a demonstration of their competency of course material. Further research should consider incentivizing students to complete these games and/or modifying these games into the curriculum of the course as required assignments. Another limitation of this study could be the platform in which these games were housed and accessed; namely Canvas.

Admission to these games required students to login to our LMS and navigate to the appropriate page. This platform requires a strong internet connection and the appropriate hardware & software such as the latest version of Adobe Flash Player which some students may not have.

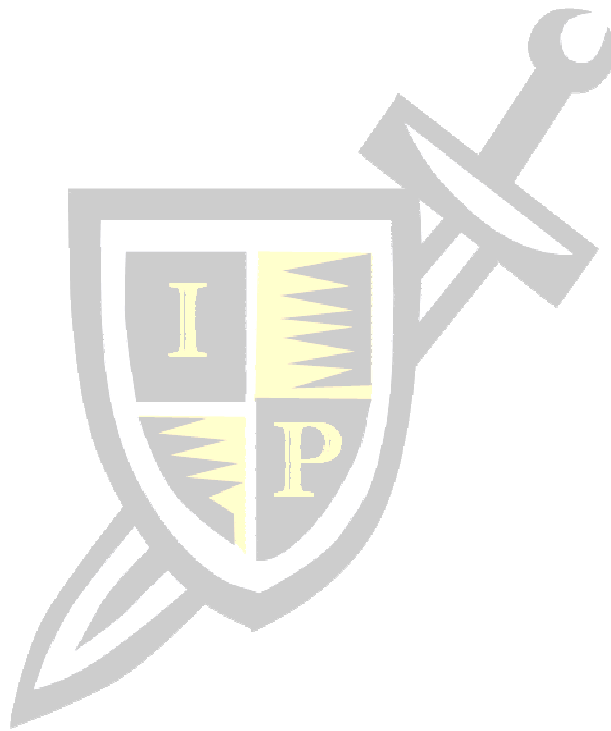
This is an important issue not only for students, but for instructors working on creating better learning experiences with instant feedback and better learning environments. It is also important for universities that are under pressure to find teaching tools that will provide a better learning platform for students at a much cheaper cost. This study signals the need for further research in this pedagogical area.



**Table 1****Results on Average Course Grade for Treatment Vs Control Students**

	Student		F-test Equality of Variances			t-test Unequal Variances		
	Treatment	Control	<i>F</i>	<i>df</i>	<i>P</i>	<i>t</i>	<i>df</i>	<i>p</i>
<i>M</i>	80.7	82.4	3.49	(59, 55)	< .000001*	1.71	91	< .09**
<i>SD</i>	6.7	3.6						
<i>n</i>	60	56						

\*Significantly Different ( $\alpha = .05$ ) \*\*No Significantly Different ( $\alpha = .05$ )



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