Understanding the Effects of Social Buttons in a Learning Game

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Abstract

Game-based Learning is an emerging field of practice that focuses on the use of digital gaming platforms (e.g. learning games) and technologies for purposes of education. This study aims to understand the effect of the addition of social buttons to a learning game platform. The experiment was conducted in a university located in the Northern part of Taiwan. A total of 98 students (51 from the experimental group and 47 from the control group) completed the five-week experiment who were mostly third year students in the university's Department of Information and Management. For the duration of the study, the game platform was programmed to automatically record the activities of the students who are logged on, including those in which they took part in, and to whom they interacted with. In general, this research finding indicates that the addition of a social button to a learning game has indeed a positive effect, and that those students who played in the learning game with a social button improved their quality but not their quantity of learning engagement. Findings of this study suggest that although social buttons do not increase a learner's level of satisfaction, they can improve learning outcomes, and increase the learner's willingness for continued participation.

Keywords: Serious game, learning game, social buttons, learning outcome

1. Introduction

In an effort to create a positive experience in learning, teachers have utilized a wide range of initiatives and practices designed to improve the learning process for students. One such practice is "Serious Game" which integrates games into the learning environment for the purpose of improving students' learning. Game-based Learning is an emerging practice that uses digital gaming platforms and technologies for educational purposes. An increasing number of researches have contributed to the improvement of digital game-based learning (Hwang & Wu, 2012). Most of these researches were focused on the design, implementation, and evaluation of serious games. It is often assumed that fun game play experiences are largely the reason for students' increased interest in studying which results in a deeper and more sustained learning.

Nowadays, different types of social buttons have diffused across blogs, news websites, social media platforms and other types of websites. The term "social buttons" include the various buttons present on web pages, including social bookmarking buttons, voting buttons, sharing buttons and like buttons et al. These buttons allow users to easily express their support to the content of the platform and enable them to recommend it to other users. According to Facebook (Facebook, 2010), social buttons are a major incentive to user behavior on the Internet. For instance, the "Like" and "Share" buttons are highly valuable because they increase the social experience of web users. By increasing the quality and quantity of social bond over the internet, these "likes", "shares" and "tweets" may be

viewed from a new media studies perspective as new types of hyperlinks. Moreover, from an economic sociology perspective, these may open up questions about the increasing interrelation among social experience, technicity and online value (Gerlitz & Helmond, 2011; 2013).

In general, learning is seen as an individual pursuit, however, it is still essentially a group activity. In some specific situations, it is only through "Group Learning" that the most effective mental activity can be achieved. Consequently, "Social Bond" has obvious effects on our willingness to learn and on learning outcomes (Keverne et al., 1997). In addition, it can be expected that the addition of a social button to a learning game may increase the quality and quantity of social bond while engaging in a learning game. It is also expected that certain impacts should occurred during the learning process. The question of how "Like" buttons affect a student's study habits within a "gamified" environment is worthy of further investigation.

The addition of a social button function on the design of the gaming platform appears to be an almost insignificant change, yet, it is clear that such a small feature can positively alter the study habits of a student. This study used "The LEGO Game", a learning game developed on Facebook, to design an experiment comprising 106 university students. These students participated in a learning game wherein "like" buttons were added to the experimental group's gaming platform but not for the control group. After examining the differences in the learning processes of the experimental group and control group, we discuss the effects of the addition of social buttons to serious games on students' learning. Furthermore, we hope that with the abundant behavioral data collected on the gaming platform during the experiment, we will be able to engage in a deeper exploration of the effects of social buttons on students' engagement and learning outcomes.

This study proposes two research objectives:

1. Understand the effects of the addition of social buttons on students' engagement, learning outcome, and willingness to continue participating.
2. Explore the changes of learning behavior on the addition of social buttons in the context of learning games.

2. Literature Review

2.1 Learning Games

Games are activities in which a player must learn a new skill, use it and combine it with other learned skills to overcome challenges, and gain rewards when the game objectives are successfully met (Passos, Medeiros, Neto, & Clua, 2011). This process is competitive and challenging in nature, and provides participants with a certain level of satisfaction, as well as feedback after game completion. In addition, games are interactive, and the varying decisions and behaviors of different participants, can produce different outcomes and responses (Costikyan, 2002). "Gamification" refers to the introduction of game elements to non-game environments in order to improve participants' level of engagement and quality of experience (Deterding et al., 2011). Gamification has been wildly used to encourage people to participate in an activity, increase the effects of the activity, and to help achieve its goals (Luminea, 2013). According to Corti (2006), serious games involve using the influence of computer games to draw end-users' attention and engage them to perform a specific purpose, mainly to develop new knowledge and skills. Serious games are usually employed in education and learning. Gamification and serious games can indeed alter persons' attitudes towards their obligations, be it work or studying. Furthermore, key concepts of games such as goals, rules, challenges, and interaction are also present in several real-world activities; for instance, the learning process. Therefore many previous studies (e.g. Prensky, 2005; Hwang & Wu,

2012; Luminea, 2013) have supported the idea that the use of games can be an effective way of helping people to accept reality, face challenges, and even to perceive themselves as heroes capable of solving their current difficulties and achieving their goals (McGonigal, 2011).

2.2 Social Buttons and the "Like" Button

The goal of introducing social buttons in social platforms is to increase users' interaction with their social group, making them more integrated and inseparable. For example, visual representation of a social button resembles an icon along with an optional counter that shows the number of times a particular piece of content has been liked or shared in a specific social networking site. Each social button is highly specific and is strategically displayed to ensure that the user can easily identify it and read the counter correctly. Very little work has been done in studying and analyzing social buttons. Gerlitz and Helmond (2011; 2013) emphasized the notion of the "like" economy, as a framework to better understand social buttons. According to Gerlitz and Helmond, social buttons provide the simplest way of expressing social bonds between people. By clicking "like," one conveys approval to another person. This type of feature can strengthen individuals' recognition of their social groups, and allows individuals to easily feel acknowledged by groups; therefore, social buttons may create a positive change in the individual's online and real-life behavior. Social influence induces a sense of belongingness and it affects learning behavior in such a way that when a student joins an online study group, it promotes active engagement while studying with the group. Social Influence is a key factor when designing academic courses in higher education. It refers to learning activities that promote students to collaborate work together, usually in a small group, to attain mutual goals. The ever increasing popularity of social media makes it a promising source for the personalization of gameplay experiences. The researcher of this study believes that by involving friends in the social media and present their influence through the social buttons in a learning game, the satisfaction of students can be greatly enriched and their performance during the learning process may be increased.

This study will therefore address the following research questions:

- Do social buttons influence students' engagement in learning game?
- Do social buttons influence students' learning outcomes in the learning game?
- Do social buttons influence students' willingness to continue participating in the learning game?

3. Research Method

3.1 The LEGO Game: Game Platform and the Learning Game

Academic courses in the university usually require students to read extensively before commencing with the course; generally, students tend to skim through the course material without actually reading it in detail. "The LEGO Game" is a game platform on Facebook that uses gamification to motivate students to complete this mandatory reading.

In "The LEGO Game", teachers create a list of requisite readings and a timeline is set for its completion. Students can log on to the platform to read before the deadline. After completing the required readings, the student has the option to write questions, with reference to the reading, for their classmates to answer or they can answer the questions provided to test their memory and comprehension.

Figure1: The LEGO Game

Both creating questions and answering questions can earn points for students, which can then be used at the LEGO store to buy LEGO bricks. At the end of the semester, students can utilize their bricks to compete in a LEGO building competition.

Students are also allowed to challenge their classmates to compete in answering questions to make the game more interesting; subsequently, the winner can claim the points of the loser. Apart from LEGO bricks, the LEGO store also sells "magic cards" which can be used during games(for example, the bomb card can be used to blow up all the LEGO bricks that belong to an opponent; while a defense card can protect a player from the opponent's bombs).

Figure2: The LEGO Store and the LEGO Building Competition.

3.2 Experimental Design

The experiment was conducted in a university located in the Northern part of Taiwan. A total of 124 senior undergraduates enrolled from the "Software Project Management" course were chosen for the study. Students were provided with five pre-reading materials related to project management that need to be completed within five weeks. They were equally divided and randomly assigned into two groups: experimental group and control group. Those in the experimental group were asked to use a gaming platform with social buttons, while those in the control group were also provided with the same gaming platform but without the social buttons. A total of 106 students agreed to participate in the experiment (55 for the experimental group and 51 for the control group), mostly third year students in the university's Department of Information Management. Member of the experimental group were asked to answer a set of questions. Each question was accompanied by a "like" button, with a "like" counter displayed beside it. Those who approved of the question were asked to press the "like" button. The number of "likes" the question has gained could then be seen on the personal page of the author.

The five-week experiment was successfully completed by 98 students: 51 from the experimental group and 47 from the control group. There were no significant differences in the gender and age demographics among the experimental and control group. During the study, students had generated 4,296 questions and which were answered 20,600 times. On average, each student spent 30.40 hours playing the game. To help researchers analyze the status of the students throughout the five week period, , the platform was programmed to automatically record the activities of the students, including those in which they took part in, as well as to whom they interacted with every time they log on to The Lego Game.

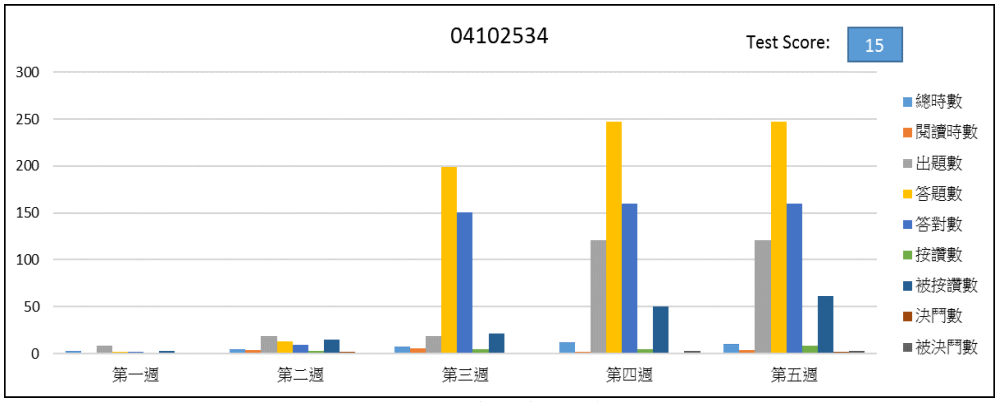

Figure3: The Study Profile of a Student "04102534"

Students' engagement was measured by: (1) the amount of time spent in the game platform, (2) the number of question that the student generated, as well as (3) the number of questions answered.

The quality of students' engagement on learning was measured by assessing the quality of questions generated by both the experimental and control groups. This was done by randomly selecting 100 questions from all the questions generated by the students each week (50 questions from each group). Questions from different groups are then mixed and assessed by three teaching assistants (All were graduate students in the IM Department). In order to ensure inter-rater reliability, only the questions that had receive consistent rating from all three TAs were accepted (the rating scale used was 0-10 point with 0 being the lowest and 100 being the highest; the difference among the ratings from three TAs cannot exceed 1.0). The result of the assessment on the quality of the questions was then used to determine if there was a difference in the quality between the experimental group and the control group.

Subjective measurement for students' learning outcomes was done by asking the students to assess their own feelings of satisfaction with regard to their learning outcome during the experimental period. The score of their final test serves as an objective measure of the learning outcomes. Students' willingness to continued participation was measured through administration of a willingness evaluation questionnaire,

Participants were required to undergo a 50-item final test, scored by the instructor, at the end of the experiment to determine their learning outcome. To ensure the validity and objectivity of the test, all questions were multiple choices with clear correct answers. These questions were derived from the reading material that the students had been given at the start of the experiment. After this, students were required to complete a questionnaire to evaluate their satisfaction with their learning, and their willingness to continue participating in the learning game.

4. Research Analysis

A comparison of each group's engagement, learning outcome, and willingness to continue participating were done. Subsequently, the differences in each group's learning process due to the presence or absence of social buttons were also explored.

1. Do social buttons influence students' engagement?

It is interesting to note that there was no significant difference between the groups, in terms of (1) the time spent on the gaming platform (Table 1, p=.385), (2) the number of questions generated (Table 2, p=.229), and (3) the number of questions answered (Table 3, p=.52). Further analysis

revealed that during the first two weeks of the experiment, the experimental group surpassed the control group for these metrics; but during the next 3 weeks, the control group began to catch up with the experimental group, and eventually outdid them. Researchers believe that the two primary factors that allowed the participants to continue and finish the serious game are: first, there is the positive incentive of it being an interesting game; and second, there are negative consequences for not completing the required work such as penalties. Towards the end of the experiment, when there was limited time to complete the game, students who were not previously involved, responded to this negative incentive by working harder to make up for lost time.

Table 1: The Time Spent on the Gaming Platform

	Group	Number	Means	Standard Deviation	Standard Error	t-value	Degree of Freedom	p-value
Time on Gaming Platform	With Button	51	6.43	4.415	0.618	0.872	96	0.385
	Without Button	47	5.70	3.805	0.555			

Table 2: The Number of Questions Generated by Students

	Group	Number	Means	Standard Deviation	Standard Error	t-value	Degree of Freedom	p-value
No. of Questions Written	With Button	51	52.82	84.75	11.865	1.21	96	0.229
	Without Button	47	34.09	66.676	9.726			

Table 3: The number of questions answered

	Group	Number	Means	Standard Deviation	Standard Error	t-value	Degree of Freedom	p-value
No. of Questions Answered	With Button	51	194	304.1	42.58	-0.645	96	0.52
	Without Button	47	227.8	197.9	28.87			

Nevertheless, as debated in the fields of management, positive incentives encourage people to do something well, but negative incentives encourage people to work merely to incur the minimal damage. This was reflected in the TAs' assessment of the quality of questions generated by the student themselves, where the quality of questions written by students in the experimental group was evidently better (Table 4, p=.062) and more consistent. Comparatively, although there was a small difference in the number of questions written by the control group (Table 2, p=.229), their overall quality was significantly lower with a wide disparity between the good and bad questions. Moreover, the control group preferred to answer questions written by others rather than to write the questions themselves since it was the more efficient way of accruing points. Members of the experimental group wrote an average of 52.82 questions while the control group wrote an average of 34.09 questions only (Table 2). Consequently, members of the control group responded to 227.8 questions on an average while the experimental group responded to only 194 questions (Table 3).

The analysis results suggest that social buttons did not affect the quantity measures of students' engagement; however, it seems that social buttons did have a significant influence on the quality of student's engagement on the game.

Table 4: The Quality of Questions Written by Students

	Group	Number	Means	Standard Deviation	Standard Error	t-value	Degree of Freedom	p-value
Quality of Questions Written	With Button	51	3.31	8.32	1.165	-1.887	96	0.062
	Without Button	47	14.47	41.336	6.03			

2. Do social buttons influence students' learning outcomes?

It is noteworthy that the addition of social buttons did not have a significant effect on students' self-assessment of learning outcome satisfaction (Table 5, P=.302), but comparison of each group's performance on the final test revealed a clear difference. Out of 20 questions, the experimental group, answered an average of 13.88 questions correctly; whereas the control group, answered an average of 11.26 questions correctly (Table 6, P=0.001).

The researchers believe that the stimulation the serious game provided was the main factor responsible for a student's increased satisfaction with the learning outcome. Even though the difference between the scores of the experimental group and control group are small, the former having scored 4.6 compared to the latter's 4.43, both of these scores are still relatively high when compared to the more traditional pre-course reading activity, having a satisfaction level below 4.00. Therefore, it is evident that the serious game has a perceivable effect on students; however, research data indicates that students do not necessarily realize the social influence that accompanies the use of social buttons, or its positive effect on their studies.

Table 5: The Students' Self-Assessment of Learning Outcome Satisfaction

	Group	Number	Means	Standard Deviation	Standard Error	t-value	Degree of Freedom	p-value
Satisfaction of Learning Outcomes	With Button	51	4.60	0.629	0.088	1.039	96	0.302
	Without Button	47	4.43	0.935	0.136			

Table 6: The Students' Performance on the Final Test

	Group	Number	Means	Standard Deviation	Standard Error	t-value	Degree of Freedom	p-value
Learning Outcomes	With Button	51	13.88	4.107	0.575	3.368	96	0.001
	Without Button	47	11.26	3.566	0.52			

On further examining the data generated by the study, the researchers discovered that the effectiveness of social buttons on learning outcomes varied from that predicted by the general theory of motivation. Moreover, there was no significant difference in the learning outcomes (Table 7, P=.551) between the eleven students from the experimental group who received frequent "likes" (received at least one "Like" each week) and the other 40 students. Obviously, there is no evidence to suggest that when a student receives "like" more frequently, it will result in a better study habit.

Comparatively, the 18 students who pressed "liked" on others more frequently (click at least one "Like" in each week), compared to the other 33 students, clearly had better learning outcomes. They scored an average of 16.33 out of 20 in the final

test, compared to those students who did not pressed "like" frequently (P=0.001) who only scored 12.55. Clearly, those who pressed "like" frequently had a higher level of engagement and scored higher marks in general. The number of questions they had answered and the number of question they had written were both significantly higher than others as well (P=0.026 and P=0.001).

3. Do social buttons influence students' willingness to continue participating?

As described above, the presence of a social button on a gaming platform does not necessarily result in higher levels of satisfaction on the students' learning outcome. Consequently, it is not expected that a significant difference between the two groups' willingness to continue participating in a similar serious game setting will be apparent. According to the results of this study, however, the experimental group was evidently more willing to participate in a similar study in the future as compared to the control group (Table 9, P=0.071). The researchers believe that this finding is consistent with Gerlitz & Helmond's (2011; 2013) observation that social buttons can foster an individual's integration into a social group. Social buttons may not have the effect of increasing an individual's satisfaction, but it can make an individual more likely to continue using the social platform.

Table 7: Difference of the Learning Outcome between Students Who Received "Likes" Frequently and Others

	Group	Number	Means	Standard Deviation	Standard Error	t-value	Degree of Freedom	p-value
Learning Outcomes	Received "Like" Frequently	51	14.55	5.592	1.686	0.601	49	0.551
	Others	47	13.70	3.667	0.580			

Table 8: Difference of the Learning Outcome between Students Who Click "Likes" Frequently and Others

	Group	Number	Means	Standard Deviation	Standard Error	t-value	Degree of Freedom	p-value
Learning Outcomes	Clicked "Like" Frequently	51	16.33	4.116	0.97	3.48	49	0.001
	Others	47	12.55	3.483	0.606			

Table 9: The Students' Willingness to Continue Participating

	Group	Number	Means	Standard Deviation	Standard Error	t-value	Degree of Freedom	p-value
Willingness to Continue Participating	With Button	51	4.61	0.645	0.090	1.828	96	0.071
	Without Button	47	4.24	1.266	0.185			

5. Research Findings and Discussion

1. Social buttons help students to focus on the quality of their learning instead of game play.

Our research finding has shown that social buttons do not prompt students to spend more time playing learning games, or to complete additional homework. Instead, with the addition of social buttons, students are more likely to pay attention to the quality of their work (the questions they had written). This study also found that students in the experimental group had performed better during the final test than those in the control group. The authors of the study believe that the reason for this is that the social buttons make students realize that their actions will be evaluated by their classmates, and that their classmates'

perception of the quality of their work will be evident in the number of "likes" it receives. This potential of social influence can make students voluntarily pay more attention to their work. Comparatively, the students in the control group, though will still play the game with the same enthusiasm and for approximately the same amount of time, but they are more likely to spend time on the more rewarding and less effort-consuming portions of the game (e.g. answering questions instead of writing questions). They will not be as willing to exert themselves in writing questions, despite the fact that this is more important from the learner's point of view.

2. In a vivid serious game, the effects of social influence may be hidden and may not be sufficiently perceived by the students.

Our research has clearly shown that the addition of social buttons has helped increase the learning outcomes of students; however, it is more likely that the excitement brought about by the serious game itself had resulted in the students increased level of satisfaction and not the social button. Accordingly, the association between the addition of social buttons and students' level of satisfaction is unclear (P=.302) even though this study found that students in the experimental group have greater levels of test performance than those in the control group. It is apparent that the students had perceived the effect of the serious game; however, they have not observed the social influence or the positive effect of social buttons on learning outcomes as easily.

3. The affirmation through social buttons does not necessarily encourage students to intensify their engagement or improve learning outcomes.

Our research has shown that there is no evidence that when students get "like" more frequently, they will study harder and have a better score on the final test. Alternatively, those students who pressed the "like" button for others more frequently are actually more involved and obtained better outcomes. The act of "liking" another student's post is mostly only a sign of approval or an indication of social interaction, and is not an effective motivator for those who have received them.

4. The social bond created by social buttons can increase willingness to continue participating.

Our finding has clearly shown that the experimental group with social buttons was more willing to participate in similar future learning activities than the control group. The researchers believe that this finding indicates that social buttons can improve an individual's engagement within a social group. Social buttons do not cause an individual to be more satisfied with their learning outcome, but can generate a type of social bond that makes a student want to continue participating in these types of learning activities.

6. Conclusion and Limitations

The use of serious games and gamification can help improve students' learning engagement and outcomes. The LEGO Game platform utilized in this study came in use in 2012 and since then, has seen to clearly improve the engagement of students towards pre-course required reading. Simply put, as time spent studying increases, satisfaction and educational outcomes also improve; also, students are more willing to participate in similar activities in the future. This study was focused on the effect of the addition of social buttons to The LEGO Game platform. In general, our research finding indicates that there is indeed a positive effect with the addition of social buttons, and that students who used The LEGO Game with social buttons improved their quality of engagement, learning outcomes, and increased their willingness to continue participating.

The findings of this study had mainly explored the effects of social buttons, and had identified important trends for further deliberation. This study was exploratory in nature; therefore, its observations will likely require further research to establish their validity. It is possible that the mechanism through which social buttons increase student's test performance are different from the mechanisms through which social buttons affect involvement and outcome satisfaction. The researchers believe that it might be related to how the social button increases the individual's visibility within the social group, however, further study might be needed for this.

Research of this type is rare, and the authors of this study believe that its findings are valuable for teachers and researchers who are interested in contemplating the effects of integration of learning game and social buttons.

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