CELC SYMPOSIUM

13 Use of Gamification in Vocabulary Learning: A Case Study in Macau

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Abstract: The power of gamification has widely been acknowledged in education to engage and motivate learners when used properly in classrooms (Hammer & Lee, 2011; Muntean, 2011). More specifically, games can increase students' level of attention and persistence in learning. In order to win, students typically experience repeated failures when playing games, but through such repeated failures, learning takes place. This is particularly important for vocabulary learning. According to Nation (1990), learning new vocabulary in a second language requires 5 to 16 exposures. In this sense, games help provide such exposures as they involve repeated failures. This study investigated the usefulness of using Web 2.0 games to help students learn vocabulary in a tertiary institution in Macau. In this study, students learned and reviewed vocabulary through two online games, namely "Fling the Teacher" and "Jeopardy". Then an online survey was conducted to collect feedback from 91 freshmen. The aim of the survey was to find out students' opinions and attitudes towards using online games in learning vocabulary and its effectiveness. The results showed that students preferred using technology to learn vocabulary not only because it was more fun and exciting but also because it facilitated vocabulary retention. Gamification improved students' attitudes towards language learning. This study confirms that the appropriate use of gamification can enhance learning.

Key Words: gamification, Web 2.0, vocabulary learning, online games

Introduction

This paper focuses on the effectiveness of two online flash games in helping undergraduate students at a medium-sized university in Macau retain new vocabulary learned. The university is the main tertiary institution in the local region with a 32-year reputation where English is used as the medium of instruction. The majority of the students are L1 speakers of Cantonese while the rest are from mainland China who use Mandarin as their L1. Most of the students attended Chinese-medium schools throughout their primary and secondary school education.

Students are placed into different English courses according to their English proficiency level. However, there is one common problem among students irrespective of their English levels. They claimed that it is difficult for them to remember and retain English vocabulary that they have learned. The traditional way is to complete exercises such as multiple-choice questions, blank-filling, and cloze on worksheets to enhance and review the vocabulary learned, but students are not motivated. They are also shy to ask questions to clarify the meaning of words or phrases which they are not sure of. Doing vocabulary worksheets is boring and painful for them. In view of this, the researcher created online vocabulary games using Web 2.0 tools to help students review vocabulary in an interesting and interactive way. Besides, Chinese students tend to be passive learners, relying heavily on teachers to help them in their study. In order to guide them to become active learners, students are required to collaboratively produce their own games to challenge their peers.

The aim of this study is to identify the effectiveness of using online flash games in learning and reviewing vocabulary. The study attempts to answer the following two research questions:

1. Can interactive online games help students learn and retain vocabulary?
2. What are students' perceptions of using online games to review vocabulary?

It is hypothesized that the use of online flash games will enhance students' ability in retaining vocabulary. It is also expected that there will be positive feedback about the usefulness of interactive online games from students. This study should help gain insights into the students' attitudes towards incorporating technology into the course. If their attitudes are positive, more Web 2.0 tools can be integrated into the language courses. Furthermore, if students share the same positive views towards the effectiveness of using games in teaching, then it may show that gamification can improve students' learning across disciplines as the participants are from different courses. Therefore, the researcher would like to conduct this research project to test these hypotheses.

Literature review

Knowing and memorizing vocabulary of a foreign language is essential if one wants to learn that target language, and repetition is necessary to help retain new knowledge. According to Nation (1990), learning new vocabulary in a second language requires 5 to 16 exposures. However, if learners rely on drilling alone, which is a popular way for most Chinese students when learning English vocabulary (Dai & Gao, 2011), it is very boring and will eventually decrease students' interests in learning (Yue, 1991; Deng & Hu, 2007). Therefore, it is imperative for teachers to find ways to help students remember new words in a more interesting and interactive manner.

Gamification and motivation

Motivation is crucial in learning. If students are not motivated, even if they have the ability to solve a problem, they may not end up solving it. Conversely, if they are highly motivated, even though they have limited ability, motivation will help them to find the means to accomplish a task and eventually enhance the ability. However, according to Fogg (2002), motivation and ability alone are not enough; a 'trigger', which is like a call for action, is also required so as to tell the user to achieve a certain behavior. Software applications can serve as such 'trigger' to change people's attitudes and behavior.

Gamification has been shown to engage and motivate learners when used properly in the classrooms (Hammer & Lee, 2011; Muntean, 2011). Gamification is the application of game elements in non-gaming situations, that is, to convert useful activities into games (Deterding et al., 2001). Its aim is to combine extrinsic and intrinsic motivations to raise the engagement of users by using game-like techniques such as scoreboards and personalized fast feedback, and thus to motivate or influence their behaviour (Flatla et al., 2011). Intrinsic motivation is an internal desire to perform a task and results in high-quality learning and creativity while extrinsic motivation occurs when external rewards not related to the task itself drive the user to take an action, for example, money, good grades, awards (Ryan & Deci, 2000). The use of games increases students' motivation because when faced with a challenging task, they will become fully engaged. Therefore, in order to enhance motivation, teachers can incorporate game elements into work activities (Shneiderman, 2004).

In order to make learning more engaging, a game should have the following characteristics (Jones 1998, as cited in Kirriemuir & McFarlane, 2004): (i) It is something learners can complete; (ii) it is something learners can concentrate on; (iii) it has clear goals; (iv) it provides immediate feedback; (v) it encourages deep but effortless involvement; (vi) it helps learners exercise a sense of control over their actions; (vii) concern for self disappears during flow, but sense of self is stronger after flow activity; and (viii) sense of duration of time is altered. Malone (1980) and Csikszentmihalyi (1990) describe this flow of experience as the enjoyment of playing games. Prensky (2001, p. 124) summarises this kind of experience as a state when the challenges presented and your ability to solve them are almost perfectly matched, and you often accomplish things that you didn't think you could, along with a great deal of pleasure. There can be flow in work, sports, and even learning, such as when concepts become clear and how to solve problems obvious.

Games have also been shown to help learners learn better when they are participating and having fun. The colourful and interactive online games attract players because they can stimulate more than one sense at a time. Hoogeveen (1995) pointed out several benefits in using multimedia to learn a language: (i) learners respond to multimedia in a complex way and give the feeling of experiencing information instead of simply acquiring it; (ii) the man-machine interactions are more friendly interactions than face-to-face ones; and (iii) students feel more engaged with multimedia, and learning thus becomes an enjoyable experience (as cited in Deng and Hu, 2007).

Benefits of educational games

Educational games can facilitate learning experience, and the use of games in the classroom is very beneficial for students (Barab, Gresalif, & Arici, 2009). Students may give up easily when they experience failures but they react differently when playing games. The essence of video games involves perseverance, intelligence, practice, and learning in order to succeed (Gray, 2012). Lee & Hammer (2011) pointed out in their study that educational games are able to meet three types of learners' intellectual needs (namely, cognitive, emotional and social needs), thus creating positive emotional experiences. Cognitive benefits include the

development of problem-solving skills. Players must successfully complete one level before moving on to the next level. The rewards obtained for each level provide constant motivation and also develop players' skills at the same time. Gamification can also address students' emotional needs. In order to win, players must experience numerous failures, and each time they fail they learn something. The satisfaction of completing a level and advancing to the higher level offsets the negative feelings of repeated failures. Moreover, the immediate feedback provided about players' performance can be motivating and encouraging and through repeated attempts, results are improved. Students learn that making mistakes or even failure is not the end but provides an opportunity to learn and improve their skills and knowledge. However, if students experience failure in a traditional classroom, it is difficult to turn this negative emotion into a positive one. Gamification does offer the opportunity to turn negative emotions into positive experience.

In view of the popularity of video games among people of all ages and their power to engage players to hold their concentration for long periods of time, it is worth bringing this engaging and stimulating tool into the classroom. Moreover, with the availability of computers and Web 2.0 online tools, it is possible for teachers to create their own games and make learning fun.

Digital natives

The participants in this study are digital natives who were born after 1980, and the perfect learning environment for them includes computers, iPads and cell phones; online videos and games; courseware, a variety of search engines; and anything animated, interactive, and musical (Carlson, 2005; Prensky, 2003, 2004). Digital natives tend to become bored quickly in a traditional classroom because they expect a high level of interactivity (Johnson, 2012). When provided with a challenging environment, with immediate feedback and short-term goals, they experience motivational factors which are important in learning (Blumenfeld, Soloway, Marx, Krajcik, Guzdial, & Palincsar, 1991; Pintrich & Schunk, 1996). Games are considered effective both as motivation tools and as learning environments (de Freitas, 2006; Kirriemuir & McFarlane, 2004). Therefore, the goal of gamifying activities in class is to motivate students to learn and help them remember the content and materials they need to advance well through the course in a fun and relaxed way.

Methodology

Participants

Five groups of students were involved in this research. They were all aged between 18 and 20 from different faculties who had to take English I or Business English in the second semester of their first year of the undergraduate programme. There were a total of 31 students distributed in two English I classes and 70 in three Business classes. 72.3% of all the participants were local students and the rest (27.7%) were from mainland China. Of the 101 participants, 61 (60.4%) were female and 40 (39.6%) were male. The majority of the student respondents (82%) were from the Faculty of Business Administration, with 13% from Faculty of Social Sciences and Humanities, 3% from Faculty of Science and Technology and 2% from Faculty of Education.

This study was conducted in the spring semester, 2011-2012. Participants gave their consent for using the data collected from class for research, scholarly publication and/or conference presentation. After having tried the two games, students were invited to complete an online survey about their opinions on and attitudes towards using online games in learning vocabulary and its effectiveness (see questions in Appendix A). The survey was posted on Moodle, a Learning Management System (LMS) that students used in their English course. The survey completion rate among students was 91/101 (90%).

Procedures

The first step was to select a list of vocabulary words from students' textbooks. The researcher used Content Generator (http://contentgenerator.net) and Jeopardy Labs (http://jeopardylabs.com) to create interactive online vocabulary activities to review the target vocabulary with students. Both games are available free online.

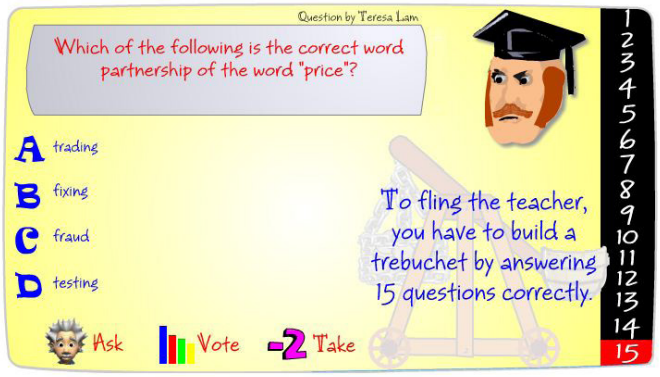
Content Generator: Fling the Teacher

Content Generator is an open-source online programme that provides games templates which allow users to create their own e-learning quizzes and flash games. The games are in flash format, and flash is freely downloadable and is installed on over 90% of the computers on the University campus. It means the games can be used on webpages, learning environments like Moodle, intranet or personal computers. There are 15 flash games templates available, and "Fling the Teacher" was selected to create the online vocabulary activity because it is similar to the television quiz show *Who Wants to be a Millionaire?* In the show, contestants are required to answer multiple-choice questions. They may use "lifelines" or "helplines" such as "Take two away", "50/50" and "Ask the expert". Students have seen this game show before so they are familiar with the rules and can start playing the game right away without spending time exploring the instructions of the game.

Students were taken to the computer lab to play this game to review the vocabulary words that they had learnt. Each student occupied a work station as this

game was intended for one player only, but students were also allowed to work in pairs. Before students started playing, they had to create a cartoon "teacher". The goal of the game was to build a trebuchet with 15 pieces of wood and then fling the "teacher" that students had created. One piece of wood would be rewarded for one correct answer. For each question, four answer choices were given (see Figure 1). To fling the teacher, students had to answer 15 questions correctly. Students might use the "helplines" but sometimes the hint might be wrong, which made the game more exciting. If an answer was wrong, they had to start from the beginning and the questions would be jumbled up and selected randomly. Therefore, it was advised to have a large question bank so students would not get bored easily answering the same question again and feel that the game was not challenging enough. In this study, 45 questions were prepared. Students were given 10 minutes to complete the game and those who finished before the time limit were encouraged either to help other classmates or play the game again because the questions might be different the second time they played it. The game would then be posted on Moodle for practice outside class.

Figure 1: Layout of the game "Fling the Teacher".



Jeopardy

After playing "Fling the Teacher", students formed into groups of 4-5 to play the Jeopardy game. Jeopardy Labs is a free, online tool for creating an answer-and-question game like the popular American television quiz *Jeopardy!* The game was slightly adapted in which contestants were asked a question and had to provide an answer rather than being presented with clues in the form of answers and phrasing their responses in question form. Questions were divided into five categories with five questions each (see Figure 2). Each team took turns to select a point value from any category. Each question carried different marks according to the level of difficulty of that question. If students gave the correct answer, they gained the corresponding point value. If their answer was wrong, points would be deducted from the team. The team who obtained the highest mark won.

Figure 2: Jeopardy game created by students

People	Vehicle	Indirect questions	Business	Intangible Assets
100	100	100	100	100
200	200	200	200	200
300	300	300	300	300
400	400	400	400	400
500	500	500	500	500

Team 1	Team 2	Team 3	Team 4	Team 5
0	0	0	0	0

To help students experience the thrill of the game before they were asked to produce one by themselves, they played the game prepared by the teacher in class which served as a demo. Then students were invited to create their own jeopardy quiz to challenge their classmates the following class. The programme is user-friendly, and a jeopardy quiz is easily done with a few clicks.

Before creating the quiz, students checked the questions and answers with their teacher to ensure accuracy. Asking students to actually create the quiz themselves has two obvious advantages: first, it serves as a good opportunity for them to clarify any misunderstanding of the new vocabulary and concepts; and second, the level of difficulty of the questions would be suitable for them too. After the game was saved, an URL was generated, and students sent the links of their jeopardy games to their teacher to be posted on Moodle.

In the following class, the teacher randomly selected a jeopardy game created by students from another class and projected it on the whiteboard for the whole class to play. As students were playing the games, they were subconsciously drilling the vocabulary.

Results

Data from the survey were converted so as to analyze descriptive statistics. Frequencies, means and standard deviations were calculated. A t-test was run to test if students from the two groups, that is, students who took English I and students from Business English classes, had different perspectives towards the usefulness of online games in helping them learn vocabulary. The data obtained correspond to the research questions listed below:

1. Can interactive online games help students learn and retain vocabulary?
2. What are students' perceptions of using online games to review vocabulary?

When students were asked to choose whether they preferred using online games or worksheet to review

vocabulary, 100% of students from English I classes and 85.5% of Business English students expressed their preference for the former (Table 1). This might be due to the fact that this was the first time interactive online games were introduced in class; thus, compared with the traditional way of revising vocabulary on paper, students found it interesting. Furthermore, all the student participants were digital natives who like the excitement that video games bring.

Table 1: Preference of using online games to review vocabulary.

	English I (N=29)		Business English (N=62)	
	Yes	No	Yes	No
Do you prefer revising vocabulary using online games more than worksheet?	29 (100%)	0 (0%)	53 (85.5%)	9 (14.5%)

When asked whether they think the use of online games can help them remember new words, 87.9% (80 out of 91) of the students commented that they could remember new words more easily when revising them through playing the two games – "Fling the Teacher" and "Jeopardy" (Table 2). In fact, students were actually drilling the vocabulary without realizing it because when they failed to answer one question in the game "Fling the Teacher", they had to start the game all over again. However, when they made mistakes working on the worksheet, the chance of them reviewing the mistake was minimal. On the other hand, when students prepared the jeopardy quiz to challenge their classmates, key ideas were being reinforced through the discussion and interaction among their group members, at the same time clearing out doubts that students might have and thus contributing to their ability to remember new words well. On the other hand, as Table 2 indicates, 18% of the students from Business English class held a different view. This might be because the vocabulary involved more difficult business terminology and complex concepts which required more detailed explanations, but the nature and format of both online games were not suitable for providing such explanations.

Table 2: Ability of online games to help remember new vocabulary

	English I (N=29)		Business English (N=62)	
	Yes	No	Yes	No
Do you think using online games to revise vocabulary can help you remember new words more easily?	29 (100%)	0 (0%)	51 (82%)	11 (18%)

Regarding the usefulness of the two online games in learning vocabulary, students considered it "quite useful" (3.6 out of 5), which implies their acceptance of incorporating educational technology into the classroom (Table 3).

Table 3: Usefulness of online games to learn vocabulary.

	English I (N=29)		Business English (N=62)		Significance level (p = 0.05)	t test
	Mean	Standard deviation	Mean	Standard deviation		
How useful do you think online games help you learn vocabulary? (1=not useful; 5=very useful)	3.59	0.87	3.52	0.88	0.92	0.72

Key: 1 = not useful, 2 = somehow useful, 3 = quite useful, 4 = useful, 5 = very useful

When asked to compare the two online games, 53.8% of the students (42 out of 91) preferred "Fling the Teacher" to "Jeopardy" (Table 4). Compared with "Jeopardy", "Fling the Teacher" has a colourful flash interface and is not just text based. Students preferred to have answer choices which made the games easier. Moreover, students commented that they enjoyed designing and dressing up the victim and seeing him being flung when they won the game. On the other hand, "Jeopardy" required team spirit, which contributed to more interaction and discussion among group members. The results showed that about half of the class preferred collaborative work. Thus, communicative approach should be used more often in class to motivate students.

Table 4: Preference between "Fling the Teacher" and "Jeopardy".

	English I (N=29)		Business English (N=62)	
	Fling the Teacher	Jeop-ardy	Fling the Teacher	Jeop-ardy
Do you like "Fling the Teacher" or "Jeopardy"?	16 (55%)	13 (45%)	33 (53%)	29 (47%)

The majority of students (82 out of 91) reported that they were willing to learn and practice vocabulary using other online games (Table 5). This shows that this new initiative was successful and that there was a lot of potential for integrating more Web 2.0 tools to engaging students in learning. The small percentage of students who expressed dislike of the online games might be those who were less tech-savvy and felt intimated when

using computers.

Table 5: Willingness to learn and practice vocabulary using other online games.

	English I (N=29)		Business English (N=62)	
	Yes	No	Yes	No
Would you like to learn and practice vocabulary using other online games?	28 (97%)	1 (3%)	54 (87%)	8 (13%)

Table 6 indicates the perceptions of students towards using online games to learn and revise vocabulary. From the data, it shows clearly that students preferred using online games to using worksheets because it was more fun, interesting and motivating. However, it was difficult to come to the conclusion whether this approach of learning was considered more intimidating, challenging, and/or frustrating by students as the number of "No response" was close to or over 50% (Table 6).

Nearly half of the students in English I classes felt intimidated and frustrated. The possible reasons were that they were not familiar with using technology and that both games were timed. The Internet connection in the computer lab might slow down if all students were using the wireless network at the same time, and computers might become unresponsive. Therefore, the speed of the Internet connection is a consideration when designing online games in the future.

Table 6: Perceptions towards using online games to learn and review vocabulary.

	English I (N=29)	Business English (N=62)
More challenging	18 (62%)	28 (45%)
Not challenging	0 (0%)	5 (8%)
No response	11 (38%)	29 (47%)
More fun	27 (93%)	60 (97%)
Not fun	1 (3.5%)	2 (3%)
No response	1 (3.5%)	0 (0%)
More interesting	23 (79%)	49 (79%)
Not interesting	0 (0%)	3 (5%)
No response	6 (21%)	10 (16%)
More motivating	20 (69%)	36 (58%)
Not motivating	1 (3%)	9 (15%)
No response	8 (28%)	17 (27%)
More intimidating	13 (45%)	20 (32%)
Not intimidating	1 (3%)	9 (15%)
No response	15 (52%)	33 (53%)
More frustrating	13 (45%)	15 (24%)
Not frustrating	1 (3%)	11 (18%)
No response	15 (52%)	36 (58%)

There were positive and negative comments about the usage of online games to learn and practice vocabulary. The overall feedback was very positive, as many students claimed that they remembered the words better than by merely completing vocabulary worksheets. Students also gave constructive feedback in improving ways of designing games in the future. The responses were categorized in Table 7.

Table 7: Students' feedback regarding the use of online games to learn and practice vocabula

Positive feedback	**No. of responses**
It is good.	6
It is fun.	9
It is exciting.	3
It is interesting.	11
Practice vocabulary using online games is better than doing worksheet	6
Learning through online games helps us remember vocabulary easier	10
Negative feedback	**No. of responses**
Lost a lot of time playing games in class	1
It is fun but it can't help in remembering vocabulary	2
Can't review a lot of vocabulary at a time	1
Suggestions	**No. of responses**
Include more questions with different levels of difficulty and quiz types	4
Include spelling quiz	2

The results agreed well with the data in Table 6 that students preferred using online games to learn vocabulary not only because it was more fun and exciting but also because it facilitated vocabulary retention. The data also provided clue as to why some students might not feel challenged, as some of them commented that the questions were easy. Nevertheless, the difficulty level of the questions was intentionally set lower, in order to enhance students' interests and boost their confidence since it was the first attempt to adapt interactive online games in class.

Overall, the data obtained showed that the majority of students preferred to use interactive online games as a tool to review vocabulary.

Discussion

Using online games seems very promising but there are possible dangers of using gamification in learning. Firstly, if the design is not suitable for

the purpose of motivating students to engage in the targeted activities, students will not benefit from it, and it will become more like a gimmick than a tool to help students learn. Secondly, rewards of most gamified activities are usually external motivating factors, such as badges, status, money, fame and praise, so students may assume that they should learn only when they are motivated extrinsically. Thirdly, gaming is seen to be an antisocial activity because most games are often played alone.

The results of this study show that gamification can help build up students' competitive spirits and can increase their cognitive and social growth. When they are given the task of creating their own game, they have to apply many different skills and use prior knowledge in order to accomplish the task. At the same time, they start to take control of their learning through the process of trial and error. This will help students become competent and independent learners.

It is worth noting that some students may not be interested in games and are not tech-savvy, so they may feel intimidated. Teachers should provide guidance by demonstrating how to play the game so students do not have to spend a lot of time experimenting with it, which may be a deterrent for them. Technical support is essential to reduce students' frustration especially if they have to create their own video games.

Gamification also helps students become active learners. Students' feedback shows that many students tend to focus only on the fun and usefulness of online games in helping them learn and retain vocabulary, but they overlooked one important aspect in this experience. They were engaged and motivated during the production process of the online game. While creating their own games for their peers, they took the initiative to clarify any misunderstandings and misconceptions they had about the terminology and explored the different usages and applications of the new words. Through this process, student-centred learning was promoted. Students did not rely on their teachers in learning. They no longer have to merely complete worksheets provided by their teachers in order to check their understanding of what was learned. They can take the initiative to ask questions, rethink, internalize the knowledge, and become active learners.

Conclusion

Gamification has been shown to make education more interesting and engaging. It helps students to become more motivated towards learning because of the positive feedback they get from the game which then stimulated them to learn. However, when a course or even an activity is gamified, a clear goal must be set. If a game is well-planned, it can increase students' motivation, engagement, and cognitive development. From this study, it is shown that gamification could improve students' attitudes towards language learning and that the appropriate use of gamification can enhance learning.

Acknowledgements

I would like to thank my colleague, Phil Cozens, in encouraging me to use games in my teaching.

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Appendix A: Survey about the effectiveness of "Fling the Teacher" and "Jeopardy"

1. You prefer revising vocabulary using online games than worksheet.
   ☐ Yes ☐ No
2. You think using online games to revise vocabulary can help you remember new words more easily.
   ☐ Yes ☐ No
3. From 1 to 5, rate how useful do you think online games help you learn vocabulary.
   1= not useful; 2 = somehow useful; 3 = quite useful;
   4 = useful; 5=very useful
   ☐ 1 ☐ 2 ☐ 3
   ☐ 4 ☐ 5
4. Do you like "Fling the Teacher" or "Jeopardy"?
   ☐ Fling the Teacher ☐ Jeopardy
5. Would you like to learn and practice vocabulary using other online games?
   ☐ Yes ☐ No
6. Learning and revising vocabulary using online games rather than worksheet is:
   ☐ more challenging ☐ more motivating
   ☐ not challenging ☐ not motivating
   ☐ more fun ☐ more intimidating (frightening)
   ☐ not fun ☐ not intimidating (frightening)
   ☐ more interesting ☐ more frustrating
   ☐ not interesting ☐ not frustrating
7. Do you have any comments about the use of online games to learn and practice vocabulary?

About the Author

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