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## INFORMATION & COMMUNICATIONS TECHNOLOGY IN EDUCATION | RESEARCH ARTICLE

# Motivating EFL students: E-learning enjoyment as a predictor of vocabulary learning through digital video games

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**Abstract:** The present study examined e-learning enjoyment to see if it could predict high school students' vocabulary learning through a digital video game. Furthermore, the difference between those who played and those who watched the game was assessed. Participants of the study were male, high school, EFL students ( $N = 136$ , age 12–18) randomly assigned to two treatments: Players, who were exposed to the vocabulary through playing a digital video game and Watchers, who watched two classmates play the same game. After the treatments (one session a week for five weeks), an e-learning enjoyment scale and a vocabulary posttest were administered. Also, researcher field notes were written down. Data analysis involved  $t$  tests, ANOVAs, and a standard multiple regression. The results indicated that e-learning enjoyment significantly predicted the variance in game-enhanced vocabulary learning. There was no significant difference between Players and Watchers. It is concluded that enjoyment could help students keep up through the sustained, long-term process of language learning by motivating them. Also, the findings help identify better suited commercial video games for educational purposes and design more useful educational video games.

**Subjects:** Video Games; Applied Linguistics; English Language

**Keywords:** digital video games; game-based language learning; vocabulary learning; e-learning enjoyment; language learning motivation

### ABOUT THE AUTHORS

Mohsen Ebrahimzadeh has an MA in TEFL and a BA in Translation Studies. He enjoys working with children as a high school teacher and researching ways to enhance second language learning. His research interests include game-enhanced language learning, vocabulary learning, and the use of technology in educational settings.

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### PUBLIC INTEREST STATEMENT

Do your kids spend a lot of time on video games? Can this be related to learning? This is what inspired the present study. It has been argued that children play video games since they are fun and they learn from them. The study investigated whether such games could help second language vocabulary learning. We, as high school teachers, allowed our students to play a video game in the classroom. Then, we tested them on vocabulary learning and their experienced enjoyment. The results showed that the students learned a substantial amount of new vocabulary from the game. Also, we found the enjoyment they experienced through the video game to motivate our students for second language learning. Thus, video games seem to be beneficial complementary activities for language learning though the amount of time spent on them is debatable.



Mohsen Ebrahimzadeh

## 1. Introduction

### 1.1. *Enjoyment in game-based language learning*

Enjoyment is defined as an attitude, circumstance, or favorable response to a stimulus that tends to make one gratified or happy (Merriam-Webster, 2014). As a construct, however, researchers have defined it as an emotion, attitude, blend of affect and cognition, satisfaction of intrinsic needs, and some imprecise positive reaction to the media content (Tamborini, Bowman, Eden, Grizzard, & Organ, 2010). For example, Nabi and Krcmar conceptualized it as “a general positive disposition toward and liking of media content” (2004, p. 290).

Scholars have encouraged the use of digital video games (DVGs) as educational instruments (e.g. Gee, 2003; Van Eck, 2009) since they are designed to be fun and engage gamers so as to further persist through training, especially in comparison to traditional classroom settings (Garris, Ahlers, & Driskell, 2002; Gee, 2005). DVGs are believed to have inherent characteristics such as competition, narrative, fantasy, climax, and visualization (Ang & Zaphiris, 2008) that promote enjoyment and task engagement which can result in deeper acquisition of knowledge (McNamara, Jackson, & Graesser, 2010).

Reinhardt and Sykes (2012) made a distinction between game-based and game-enhanced language learning. The distinction mainly involves the kind of DVG used for language learning purposes with the former using an educational DVG and the latter implementing a commercial one. Regarding enjoyment, it is arguable that a commercial DVG would be more fun and enjoyable compared to an educational DVG in which esthetic features are not focused on. According to Reinhardt and Sykes (2012) research should focus on both types of DVGs in order to identify their strengths and thus enhance the practice of second language acquisition through DVGs.

### 1.2. *DVG enjoyment: Key issues and scholarly works*

Csikszentmihalyi (1991) identified eight major components regarding the phenomenology of enjoyment. First, there should be a chance to complete the task or challenge. Second, it should be possible to concentrate. Third and fourth, concentration is usually realized through having clear goals and receiving immediate feedback. Fifth, task involvement is so deep, yet effortless, that removes daily worries and frustrations. Sixth, the enjoyable experience enables people to feel some sense of control over their activity. Seventh, the sense of self is forgotten during flow and emerges stronger afterwards. Finally, time distortion happens with hours passing by in minutes or vice versa. Should all these elements be present, their combination “causes a sense of deep enjoyment that is so rewarding people feel that expending a great deal of energy is worthwhile simply to be able to feel it” (Csikszentmihalyi, 1991, p. 49) signifying that flow is an end in itself or intrinsically rewarding (Sweetser & Wyeth, 2005).

Sweetser and Wyeth (2005) determined the manifestation of Csikszentmihalyi’s (1991) flow components in DVGs. The result was GameFlow which is a model for evaluating player enjoyment in DVGs. In this model, enjoyment is considered conceptually similar to flow, with the additional component of social interaction reinforced through competition, cooperation, and connection. Later on, Fu, Su, and Yu (2009) turned the model into a scale that measures learner enjoyment in e-learning games. The scale has eight dimensions including concentration, goal clarity, feedback, challenge, autonomy, immersion, social interaction, and knowledge improvement. Fang, Chan, Brzezinski, and Nair (2010) developed another instrument aimed at measuring enjoyment from computer gameplay. They introduced three constructs based on Nabi and Krcmar’s (2004) work, namely, affect, cognition, and behavior to conceptualize enjoyment.

Allen, Crossley, Snow, and McNamara (2014) evaluated DVG enjoyment as a predictor of perceived writing improvement using an intelligent tutoring system. The software included several educational games on explicit writing strategy instruction and practice. Involving 42 both L1 and L2 students, the study continued for eight weeks. They found that specifically for L2 students, enjoyment predicted perceived writing improvement. Quick, Atkinson, and Lin (2012) proposed a model to

provide a better understanding of the role of DVG enjoyment in education based on individual differences in preferences. It includes 28 features categorized under six factors, namely, challenge, companionship, competition, exploration, fantasy, and fidelity which can be used to explore the educational benefits of commercial DVGs. Gajadhar, de Kort, and IJsselsteijn (2008) examined the interplay between social context and the experienced enjoyment through DVGs. They found the participants of a context in which all gamers were present in one classroom to experience more challenge, fun, and perceived competence.

### **1.3. Computer-assisted vocabulary learning**

Three steps are explained by Nation (2011) as general processes that lead to vocabulary learning including noticing, retrieval, and creative (generative) use. Noticing is a private experience that is necessary for converting input into intake. It urges the learner to pay attention to the vocabulary and consider it to be a useful item. If a word is retrieved from memory for subsequent use, it is more likely to be remembered later in time. Successful retrieval can be reinforced through receptive or productive activities. Creative or generative use, the third process, is the utilization of vocabulary that was learned earlier in different contexts/ways. This reconceptualization process helps learners strengthen their understanding of a particular vocabulary item.

According to Nation (2011), vocabulary learning software needs to provide these learning conditions. For example, noticing can be harnessed through colorization, text stylization, and highlighting. Retrieval may be done through the use and/or repeated use of vocabulary to complete an objective or acquire some item(s). Finally, generative use pertains to presentation of vocabulary in different forms such as written, spoken, and pictorial. These software-related computer-assisted vocabulary learning principles also exist in DVGs since they are understood as computer software. For example, a DVG can easily provide features that promote noticing (e.g. use of colors, pictures, actions, visual effects, etc.).

### **1.4. Enjoyment and language learning motivation**

Theories of language learning motivation have changed during the last decades. According to Dörnyei and Ushioda (2011), three phases characterize these changes. The social psychological period (1959–1990), the cognitive-situated period (1990s), and the process-oriented period (turn of the century). These phases, come short since all of them (a) consider motivation as a linear phenomenon while it seems to result from a series of complex interactions and (b) employ a reductionist approach toward motivation meaning that they define a set of variables as significant contributors to what motivation is. Thus, a fourth phase was proposed.

The socio-dynamic phase considers “the situated complexity of the L2 motivation process and its organic development in dynamic interaction with a multiplicity of internal, social and contextual factors” while also aiming to “take account of the broader complexities of language learning and use in the modern globalised world” (Dörnyei & Ushioda, 2011, p. 72). In other words, firstly, different motives might have motivated a learner not just one. Thus, motivation cannot be understood without recognizing the interactions and relationships between the different underlying motives. For example, considering second language learning as an occupationally important factor may not be enough for sustained effort; learners may need to perceive it as an enjoyable and interesting activity as well (Noels, Pelletier, Clément, & Vallerand, 2000). This is preferable since individuals’ thoughts and perceptions of the context change over time which highlights the dynamicity of motivation as noted above. Lastly, the definition suggests an organic (circular) relationship between motivation and achievement rather than a linear one. In other words, the received feedback (achievement) may influence motivation and vice versa.

The sociocultural theory (Vygotsky, 1978) stresses an individual’s active participation in construction of motivational goals; also, it views what individuals internalize—learning—to be the result of this participation (Dörnyei & Ushioda, 2011). This points to the need for further investigations since enjoyment is an important factor being more frequently mentioned in the socio-dynamic phase of

language learning motivation (see Dörnyei, 2007; Dörnyei & Ushioda, 2011). For example, enjoyment plays a role when individuals are trying to decide whether to take part in an activity, especially a long-term, sustained one such as second language learning.

### **1.5. The aim, focus, and questions of the study**

Being a central characteristic of DVGs (Sweetser & Wyeth, 2005), enjoyment becomes an important aspect of game-enhanced language learning. If learners enjoy playing a DVG, chances of focused attention, persistence, exploration, and replays increase through which learning occurs (Buckley & Anderson, 2006). Still, the information we have on DVGs is rather limited and at times contradictory (Girard, Ecalle, & Magnan, 2013). Additionally, few empirical studies with a focus on gaming experience and second language development have been conducted (Cornillie, Thorne, & Desmet, 2012). Moreover, investigations on the relationships between DVGs and their purported benefits are lacking (Quick et al., 2012; Vandercruysse, Vandewaetere, & Clarebout, 2012; Young et al., 2012). Furthermore, the bulk of existing studies were done outside the classroom (Thomas, 2012). From another perspective, new theories on language learning motivation are assigning a more important role to enjoyment (Dörnyei & Ushioda, 2011). Also, it is believed that second language acquisition is a long-term, sustained effort. According to Dörnyei (2007), such an effort succeeds only if:

The educational context provides, in addition to cognitively adequate instructional practices, sufficient *inspiration* and *enjoyment* to build up continuing motivation in the learners. Boring but systematic teaching can be effective in producing, for example, good test results, but rarely does it inspire a life-long commitment to the subject matter. (p. 719)

DVGs are being used in game-mediated language learning environments hoping to alleviate boredom and disengagement by offering an enjoyable experience therefore promoting learner motivation and deeper acquisition of knowledge (Jackson & McNamara, 2013; McNamara et al., 2010). As noted above, however, the empirical evidence is lacking. The present study, thus, aimed to see if a measure of e-learning enjoyment could predict vocabulary learning through a commercial DVG. This gap was addressed by the following questions. Moreover, we examined the gap through two approaches namely, Players and Watchers to compensate for the lack of equipment in Iranian high schools.

- (1) Is there any difference in experienced enjoyment between Players and Watchers of a commercial DVG?
- (2) How well can a measure of enjoyment predict vocabulary learning through a commercial DVG?

## **2. Method**

The study examined e-learning enjoyment as a measure for predicting vocabulary learning through commercial DVGs in a high school context. Since such examinations are based on statistical analyses (Ary, Jacobs, Sorensen, & Razavieh, 2010; Stevens, 2009), we opted for a quantitative approach. However, observations were also made to triangulate the data. Cluster sampling was employed since it allows studying the participants in naturally occurring groups. The subsections that follow further explain why each instrument was chosen.

### **2.1. Participants**

Through cluster sampling, 136 EFL Iranian, high school, male students (age 12–18,  $M = 14.81$ ,  $SD = 1.45$ ) were selected. The majority of these students studied English only in high school but some attended private institutes as well. They had not gone to game-enhanced language learning classes. The classes ( $N = 9$ ) were randomly assigned to one of the two treatments, namely, Players ( $N = 65$ ) and Watchers ( $N = 71$ ). Each session, the Players were divided into several groups randomly. We tried to include five students in each group, the number being dictated by the DVG. The Watchers were always divided into two groups. In terms of English proficiency, 91.9% of the students were at the Common European Framework of Reference A1 level based on the Headway placement test published by Oxford University Press in 2012 indicating a more or less homogeneous sample.

It is noteworthy that the required permissions to carry out this study were acquired from the respective authorities in the Ministry of Education. The study was also approved by the research ethics committee of Shiraz University. In some classes, there were very few students who did not wish to participate. These were given handouts on their course book to work on during the time that treatments were being conducted. Lastly, only male participants could be included in the study due to educational policies in Iran.

## 2.2. Materials and instruments

### 2.2.1. The EGameFlow scale

To measure the learners' enjoyment from e-learning, the EGameFlow scale was used (Appendix A). It comprises 42 items on eight dimensions including concentration (six items), goal clarity (four items), feedback (five items), challenge (six items), autonomy (three items), immersion (seven items), social interaction (six items), and knowledge improvement (five items). It is scored on a seven-point Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*). The Cronbach's  $\alpha$  calculated by the developers was .942, and .885 for the present study.

Persian hardcopies of the scale were distributed among the participants which were then tabulated for data analysis. Back translation was used to observe quality. Each subscale was averaged out to calculate the mean score used for analysis. Missing data were treated using the option *exclude cases pairwise* which removes a participant from analysis only if he is missing the data needed for a specific analysis. They would still be kept, however, if they had the necessary data for other analyses.

### 2.2.2. The digital video game

The choice of *Warcraft III: The Frozen Throne* (Blizzard, 2003) was based on the learning opportunities it offered, suitability, GameFlow criteria (Sweetser & Wyeth, 2005), and technical implementation issues such as hardware, software, and game-play training requirements. We used IceFrog's (2015) map named *Defense of the Ancients*. It is a real-time strategy game in which gamers create and maneuver their units/structures trying to take control of different areas of the map and destroy their enemies (Rollings & Adams, 2003).

The students received training on how to play the game and locate, combine, or create certain items (target vocabulary). The avatars had a backpack freely accessible to them in which they stored their items. According to the Entertainment Software Rating Board and Pan European Game Information, this DVG is suitable for users 12 years old and above. Additionally, two well-known online sources on DVGs including ign.com and gamefaqs.com gave it very high popularity scores (9 out of 10 and 88 out of 100, respectively). Lastly, Sweetser and Wyeth (2005) found *Warcraft III* to perform exceptionally good in most GameFlow criteria which they argued to cover most factors affecting player enjoyment in DVGs.

### 2.2.3. Selected list of vocabulary items

Twenty one simple and compound noun phrases were selected from the game (Appendix B). The presentation order was dictated by the DVG. No strict control could be implemented on the number of times each word was visited since students could see them whenever they wished. These words were selected based on four criteria. Firstly, some were required for the gameplay. Secondly, they should have needed a reasonable amount of gold pieces (the DVG's currency) acquirable within the class's time limit. Thirdly, we tried to include items with more relevant thumbnails considering their meaning. Lastly, the way they affected the avatars had to be vividly observable in order for students to guess the meanings. These words were mainly unknown to most of the participants since they (a) were not among high-frequency words and (b) did not exist in their textbooks. Pretesting the words also supported this assumption (Players:  $M = 5.44$ ,  $SD = 4.65$ ; Watchers:  $M = 4.56$ ,  $SD = 3.68$  out of the total score 21). Lastly, as will be explained later, the students had to infer the meaning of these words through interacting with the DVG.

**Table 1. Descriptive statistics of the vocabulary tests**

	<b>N</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>Std. deviation</b>
Pretest	132	0	20	4.98	4.185
Delayed posttest	132	2	21	14.45	4.080

#### 2.2.4. *The delayed vocabulary posttest*

This test included 21 multiple choice questions (four alternatives) on the above-mentioned vocabulary items. It was first pretested four weeks before the study began to examine homogeneity. The course included five sessions (one session a week) starting in January 2016. Four weeks after the end of the course, the same test was administered as a one-month delayed posttest. For both administrations, students returned the papers within 10 min. Table 1 shows the descriptive statistics of the pre and posttest scores.

#### 2.2.5. *Researcher field notes*

Field notes were made of any special event, behavior, and ideas such as likes/dislikes, feelings, enjoyment, environment, learning, and out-of-class experiences during and after each session. These notes were used for data triangulation purposes as the questions were investigated based on statistical analysis.

### 2.3. *Data collection procedure*

The students first sat the Headway placement test and the vocabulary pretest a month before the study. The treatments, then, started and continued for five sessions—one session a week each lasting 45–60 min. During each session, 3–6 vocabulary items (making up the total of 21) were introduced to the students as explained below. The EGameFlow scale was distributed among the students in the end, followed by the one-month delayed vocabulary posttest.

For the Players, first, the students received instruction on how to work with the game's user interface prior to the course. Through the use of an overhead projector, each vocabulary item and instructions on its location were presented initially and on-demand to avoid confusion and frustration. The students then played the game trying to attain these items. Ten students competing in two equal groups joined each game.

The ultimate goal of the game was to destroy the enemy base. To do so, students had to improve their avatar's strength, agility, armor, damage, intelligence, hit points, and mana made possible by purchasing the target vocabulary items. In order to do that, they had to make money by killing enemies. The students also interacted with their teammates since they needed to collaborate to devise a plan regarding the best route to make an attack, items to buy first, or the location of an item.

The Watchers' treatment followed the same principles as the Players'. However, they just watched two classmates compete through the DVG. To add to the competition, computer controlled teammates and opponents were included. The class was divided into two groups that supported their player by providing hints and encouragement. The game was projected on a screen so that everyone could follow.

### 2.4. *Data analysis*

Data analysis was carried out through SPSS v. 21 ( $p = .01$ ). To examine the difference between Players and Watchers, independent-samples  $t$  tests were used. Moreover, an ANOVA was run to compare the pretest-posttest scores examining the effect of time. Next, the EGameFlow scores underwent standard multiple regression to see if the dimensions could predict the scores of the one-month delayed vocabulary posttest and also examine the correlations. Moreover, highlights of researcher field notes were viewed, reviewed, categorized, and analyzed to help better understand the setting, participants, instruments, goals, perceptions, and behaviors.

### 3. Results and discussion

#### 3.1. Results

The first question examined the difference between playing and watching a DVG in terms of enjoyment. Independent-samples *t* tests were run on all eight dimensions of the EGameFlow scale to examine the difference between Players and Watchers. There was no significant difference between the two groups (Table 2). Furthermore, another independent-samples *t* test ( $t = 1.082$ ,  $df = 130$ ) was run on the delayed vocabulary posttest scores which yielded no significant difference ( $p = .281$ ) between Players ( $M = 14.85$ ,  $SD = 4.22$ ) and Watchers ( $M = 14.09$ ,  $SD = 3.95$ ).

To examine the difference between pretest-posttest scores (as indicated in Table 1), a mixed between-within subjects ANOVA was run which showed the main effect for time to be significant ( $p = .000$ ) with a very large effect size (Partial  $\eta^2 = .774$ ), showing a significant change in scores from the pretest to posttest. Furthermore, the analysis showed no significant difference between the two groups ( $p = .165$ ). Thus, both groups entered regression analysis together since there was no difference between them for any of the variables involved. It is noteworthy to mention that separate regression analyses for Players and Watchers were run as a precautionary measure and the results were statistically the same as the ones presented here.

The second question focused on how well a measure of e-learning enjoyment could predict vocabulary learning through a commercial DVG. A standard multiple regression procedure was run to investigate this. The results indicated that 19.2% of the variance in the one-month delayed vocabulary posttest was explained by the model, which is a weak value based on Cohen's (1988) guidelines. However, the amount of predicted variance (19.2%) in the delayed vocabulary posttest scores explained by e-learning enjoyment dimensions reached statistical significance ( $p = .001$ ). A large effect size ( $\eta^2 = .19$ ) was observed based on Cohen's (1988) guidelines. Thus, e-learning enjoyment predicted a significant amount of variance in vocabulary learning scores.

Lastly, Table 3 demonstrates the contribution of each predictor to the total explained variance. As shown, only four dimensions had significant contributions, namely, challenge ( $p = .005$ ), immersion ( $p = .009$ ), autonomy ( $p = .010$ ), and knowledge improvement ( $p = .002$ ). Based on the  $\beta$  values, while challenge ( $-.350$ ) and immersion ( $-.291$ ) had negative correlations with vocabulary learning, autonomy (.326) and knowledge improvement (.388) showed a positive correlation. In sum, there were four significant predictors among which two were positively and two negatively correlated.

#### 3.2. Discussions

Although weak in power, the enjoyment scale reached statistical significance. This result agrees with the findings of Allen et al. (2014) who also found DVG enjoyment to predict a measure of language learning. Four dimensions of the EGameFlow scale were found to have significant correlations,

**Table 2. Examining homogeneity between the two groups**

E-learning enjoyment dimensions	<i>t</i>	Mean difference	Sig. (2-tailed)
Concentration	-1.073	-.22783	.285
Goal Clarity	-.086	-.02020	.932
Feedback	-1.690	-.36736	.094
Challenge	-1.130	-.20528	.261
Autonomy	-.818	-.21850	.415
Immersion	-.416	-.10456	.678
Social interaction	-.080	-.01707	.936
Knowledge improvement	-1.551	-.28211	.123
Total score <sup>a</sup>	-1.489	-.26126	.140

<sup>a</sup>Enjoyment as a whole (average score on all the dimensions).

**Table 3. Calculated coefficients<sup>a</sup> for each predictor**

Model	Standardized coefficients ( $\beta$ )	t	Sig.	Part	
1	(Constant)		6.812	.000	
	Concentration	-.089	-.737	.462	-.062
	Goal clarity	.053	.487	.627	.041
	Feedback	-.146	-1.184	.239	-.099
	Challenge	-.350	-2.850	.005	-.239
	Autonomy	.326	2.619	.010	.220
	Immersion	-.291	-2.658	.009	-.223
	Social interaction	.056	.438	.663	.037
	Knowledge improvement	.388	3.167	.002	.265

<sup>a</sup>Dependent variable: Delayed vocabulary posttest score.

namely, challenge, immersion, autonomy, and knowledge improvement. Challenge and immersion negatively correlated with vocabulary learning.

Challenge is found to play an important role in experiencing enjoyment (Csikszentmihalyi, 1991; Kiili, 2005; Klimmt, Blake, Hefner, Vorderer, & Roth, 2009). Challenging tasks that go beyond the skills of an individual are found to be positively related with anxiety and tasks that lack an adequate level of challenge seem to be positively related to boredom (Kiili, de Freitas, Arnab, & Lainema, 2012; Quick et al., 2012). In our case, the students seem to have enjoyed the class; however, the challenge might have not been convenient at all levels or for those with less gaming experience. Furthermore, all students were sitting together which may have increased the challenge as indicated through “the level of social presence” explained by Gajadhar et al. (2008). Random assignment could have also contributed to this since the more experienced Players may not have been distributed evenly. These may be why challenge showed a negative correlation.

Immersion is an underlying characteristic of DVGs (Prensky, 2007; Rollings & Adams, 2003). The observations showed that immersed students did not exclusively focus on vocabulary. Students were mainly immersed in the game-play, audiovisual factors, and competition. Competition can have both positive and negative correlations with enjoyment (Quick et al., 2012). The audiovisual factors, otherwise called “fidelity” (Quick et al., 2012), were not focused on vocabulary. The vocabulary items were only means to an end—victory. Thus, students were not immersed in the vocabulary items but in the game in its totality. Accordingly, we agree with Quick et al. (2012) that fidelity is an important factor. However, whether it focuses on the target content is also important. This may be why immersion showed a negative correlation in our study.

Autonomy and knowledge improvement positively correlated with the vocabulary posttest scores. Autonomous learning is defined by Holec as “the ability to take charge of one’s own learning” (as cited in Cotterall, 2000, p. 109). Students claimed that they reconceptualized the skills they learned in the class in other DVGs to guess the meaning of unknown vocabulary. This is probably the main cause for the positive correlation between autonomy and vocabulary learning. As for knowledge improvement, the results indicate that students picked up some new vocabulary. The main point is probably active student participation in knowledge construction (deciding on Persian equivalents) in a fun environment. In other words, the DVG presented new knowledge (vocabulary items), tried to make sure that the gamer understood this knowledge (presentation through textual and pictorial means), raised student interest, and provided means to apply this knowledge (using the items).

Concentration, feedback, goal clarity, and social interaction did not reach statistical significance. Concentration and feedback were negatively correlated, whereas goal clarity and social interaction showed positive correlations with the vocabulary posttest. It should be noted that since a

commercial DVG was used, concentration was not on vocabulary learning but on the game-play itself. Therefore, the vocabulary items were just means to an end. Furthermore, some students mostly asked others for help on which items to buy and hence did not pay much attention to the vocabulary items even as tools. This could explain why concentration showed a poor negative correlation with vocabulary learning. In other words, in this commercial DVG, concentration was mainly on winning the game not the tools used to do it.

Regarding feedback, the students did not pay much attention to the messages and prompts of the DVG concerning the vocabulary items. They mostly focused on the visual feedback such as color codes, shapes, and uses which are factors not accounted for in the feedback dimension of the scale. Furthermore, students might not have been able to fully utilize the textual feedback even if they intended to due to several reasons. Firstly, not all of the textual feedback was within students' English proficiency. Secondly, the textual feedback was not all relevant and did not necessarily focus on the vocabulary items, but rather included reports on Players getting a double kill for example. Thirdly, the relevant feedback was not displayed on the screen all the time. In other words, most of the time the students had to hover over a specific icon/button to activate the feedback but most of the time their cursor was over the main window controlling their avatar. Lastly, the students did not pay much attention to the feedback all the time as they were in the heat of battle. All these points help accentuate the essential role of visual feedback since vocabulary learning seems to be related to seeing the vocabulary as an object in action.

Goal clarity and social interaction were positively correlated, though not significantly. Considering the former, the DVG had a single primary goal—to destroy the enemy base. The secondary goals, manipulation of the means (e.g. buying, creating, or using certain items which included the target vocabulary items) to achieve the primary goal, totally depended on the user. It was only through the teacher's influence that some specific items had to be used. This means that the expected vocabulary learning outcome depended on the secondary goals. Being less important than the primary goals, thus, they were not directly focused on.

Social interaction did not reach statistical significance either. One possible reason is that 91.9% of the students were at the A1 level, meaning that they were not capable of carrying out their interactions in English. Another reason seems to stem from the assumptions of the items in this dimension of the questionnaire and the classroom use of the DVG. For example, there were items that asked if the DVG provided means for chatting. Although the DVG provided a chat window, no student ever used it as they were sitting beside one another and could directly talk to each other. Thus, this dimension did not adhere to the qualities explained by Quick et al. (2012) as "companionship" which could further explain why it did not reach significance.

A brief discussion on flow experience and motivation ends this section since flow and enjoyment have similar characteristics including enhanced concentration, increased intrinsic motivation, and a diminished sense of time (Sherry, 2004). Points indicative of flow experience were observed. For example, sudden interruptions such as the principal knocking on the door were most disturbing to the students. Expressions like "why can't he come later?" or "what's the big board out there for then?" were heard often. This points to concentration, immersion, motivation, and engagement which characterize flow experience (Csikszentmihalyi, 1991). This finding agrees with previous research by Bressler and Bodzin (2013) and Hong et al. (2013) in that flow experience can occur through DVGs.

In sum, the present study indicates that enjoyment correlates with vocabulary learning. Dörnyei and Ushioda (2011), on the other hand, mentioned enjoyment as an important motivational factor. Thus, enhancing enjoyment through DVGs increases language learning motivation which in turn may help students keep up through the long, time-consuming effort of second language learning. Accordingly, it may be concluded that by making the language learning process enjoyable, practitioners can help learners become more successful and improve their autonomy.

## 4. Conclusion

### 4.1. Summary

The study found e-learning enjoyment to be correlated with vocabulary learning through a commercial DVG. We administered two treatments (i.e. Players and Watchers) which showed no significant difference at the end of the experiment. This is probably because the instruments used in both treatments were the same and the procedures were similar. Other than these, people enjoy doing what they like—students generally appreciate playing DVGs. As explained by Mumford (2012), people may also enjoy watching others do their favorite activities although they might not be good at them themselves. Thus, not being required to play a DVG that someone might not be good at, therefore avoiding criticism, may have been a better option for some students. This finding indicates that it might be better to provide the students of a game-enhanced course with the option to play or watch as they like.

The e-learning enjoyment dimensions of challenge and immersion were negatively correlated with vocabulary learning. This suggests that challenge needs to be adjusted to the gamers' skill and immersion should prioritize the target content through audiovisual features. Autonomy and knowledge improvement, but, were positively correlated with vocabulary learning. This could help the future practice of selecting or designing DVGs for educational purposes to treat each dimension based on its relationship (whether to enhance or control them). Since enjoyment is an important condition of flow experience, if a commercial DVG is to be used for vocabulary learning, the target vocabulary should have a central role in the game-play with different dimensions of enjoyment designed to improve the chances of encountering the target item(s). Furthermore, by making language learning enjoyable, chances of flow experience are increased which is theoretically shown to enhance learning (Csikszentmihalyi, 1991; Kiili, Perttula, Lindstedt, Arnab, & Suominen, 2014; Kiili et al., 2012).

Game-enhanced language learning seems to correlate with enjoyment experienced by students which may enhance their motivation helping them persist time-consuming tasks such as second language learning. As noted by Prensky “a sine qua non of successful learning is motivation: a motivated learner cannot be stopped” (2003, p. 1). Thus, enjoyment as a correlated factor with vocabulary learning could help enhance language learning motivation through game-enhanced practice.

Researchers have found that individual differences influence DVG enjoyment (e.g. Fang & Zhao, 2010; Quick et al., 2012); DVGs are products with which school age children are familiar. This can cause them to think they should have a say in their utilization. Thus, it may benefit future studies to consider participant choices in deciding on which DVG(s) to use as much as theoretically viable. By identifying the more important dimensions of enjoyment, the study hopes to have shed some light on how enjoyment plays its role in increasing learner engagement.

### 4.2. Limitations of the study

The study faced several limitations. Firstly, self-report measures face a problem of validity since they are highly sensitive to the respondents' comprehension and willingness to provide honest answers. Secondly, some students were more familiar with DVGs and computers than others, which might have affected their performance. The students also had a limited age range which could limit the generalizability of the findings. To overcome these issues, we suggest similar studies be carried out with students of different language proficiency levels, using different game genres and different age groups. We also suggest the study be carried out with female students to see whether they perform similarly. Furthermore, evaluation of enjoyment in educational DVGs instead of commercial ones is required as they are believed to more readily lend themselves to learning.

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## Appendix A

### The English version of the EGameFlow scale (Fu et al., 2009)

No	Item	1	2	3	4	5	6	7
<i>Concentration</i> (6 items)								
1	Most of the gaming activities are related to the learning task	1	2	3	4	5	6	7
2	No distraction from the task is highlighted	1	2	3	4	5	6	7
3	Generally speaking, I can remain concentrated in the game	1	2	3	4	5	6	7
4	I am not distracted from tasks that the Player should concentrate on	1	2	3	4	5	6	7
5	I am not burdened with tasks that seem unrelated	1	2	3	4	5	6	7
6	Workload in the game is adequate	1	2	3	4	5	6	7
<i>Goal clarity</i> (4 items)								
7	Overall game goals were presented in the beginning of the game	1	2	3	4	5	6	7
8	Overall game goals were presented clearly	1	2	3	4	5	6	7
9	Intermediate goals were presented in the beginning of each scene	1	2	3	4	5	6	7
10	Intermediate goals were presented clearly	1	2	3	4	5	6	7
<i>Feedback</i> (5 items)								
11	I receive feedback on my progress in the game	1	2	3	4	5	6	7
12	I receive immediate feedback on my actions	1	2	3	4	5	6	7
13	I am notified of new tasks immediately	1	2	3	4	5	6	7
14	I am notified of new events immediately	1	2	3	4	5	6	7
15	I receive information on my success (or failure) of intermediate goals immediately	1	2	3	4	5	6	7
<i>Challenge</i> (6 items)								
16	The game provides “hints” in text that help me overcome the challenges	1	2	3	4	5	6	7
17	The game provides “online support” that helps me overcome the challenges	1	2	3	4	5	6	7
18	The game provides video or audio auxiliaries that help me overcome the challenges	1	2	3	4	5	6	7

No	Item	1	2	3	4	5	6	7
19	The difficulty of challenges increase as my skills improved	1	2	3	4	5	6	7
20	The game provides new challenges with an appropriate pacing	1	2	3	4	5	6	7
21	The game provides different levels of challenges that tailor to different players	1	2	3	4	5	6	7
<i>Autonomy (3 items)</i>								
22	I feel a sense of control and impact over the game	1	2	3	4	5	6	7
23	I know next step in the game	1	2	3	4	5	6	7
24	I feel a sense of control over the game	1	2	3	4	5	6	7
<i>Immersion (7 items)</i>								
25	I forget about time passing while playing the game	1	2	3	4	5	6	7
26	I become unaware of my surroundings while playing the game	1	2	3	4	5	6	7
27	I temporarily forget worries about everyday life while playing the game	1	2	3	4	5	6	7
28	I experience an altered sense of time	1	2	3	4	5	6	7
29	I can become involved in the game	1	2	3	4	5	6	7
30	I feel emotionally involved in the game	1	2	3	4	5	6	7
31	I feel viscerally involved in the game	1	2	3	4	5	6	7
<i>Social interaction (6 items)</i>								
32	I feel cooperative toward other classmates	1	2	3	4	5	6	7
33	I strongly collaborate with other classmates	1	2	3	4	5	6	7
34	The cooperation in the game is helpful to the learning	1	2	3	4	5	6	7
35	The game supports social interaction between players (chat, etc.)	1	2	3	4	5	6	7
36	The game supports communities within the game	1	2	3	4	5	6	7
37	The game supports communities outside the game	1	2	3	4	5	6	7
<i>Knowledge improvement (5 items)</i>								
38	The game increases my knowledge	1	2	3	4	5	6	7
39	I catch the basic ideas of the knowledge taught	1	2	3	4	5	6	7
40	I try to apply the knowledge in the game	1	2	3	4	5	6	7
41	The game motivates the player to integrate the knowledge taught	1	2	3	4	5	6	7
42	I want to know more about the knowledge taught	1	2	3	4	5	6	7

## Appendix B

### The selected list of vocabulary items

No	Items	Session
1	Damage	1
2	Armor	1
3	Agility	1
4	Healing salve	1
5	Ally	1
6	Gauntlets of strength	1
7	Ironwood branch	2
8	Status	2
9	Intelligence	2
10	Mana	2
11	Buckler	3

No	Items	Session
12	Robe of the magi	3
13	Chainmail	3
14	Boots of speed	3
15	Gloves of haste	4
16	Broadsword	4
17	Quarterstaff	4
18	Claymore	4
19	Perseverance	5
20	Power treads	5
21	Recipe	5



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