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Digital Video Games: E-learning Enjoyment as a Predictor of Vocabulary Learning

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Abstract

The study examined e-learning enjoyment through a digital video game to see if it could predict high school students' vocabulary learning. It also assessed the difference between those who played and those who watched the game. 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 treatment (one session a week for five weeks), an e-learning enjoyment scale and a vocabulary posttest were administered. In addition, 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 digital video games help language learners keep up through the sustained, long-term process of language learning by making it enjoyable. Also, the findings help identify better suited commercial video games for educational purposes and design more useful educational video games.

1 Introduction

1.1 Digital video games and language learning

Computer technology is growing fast especially regarding Digital Video Games (DVGs) with billions of dollars being invested in this industry (McDonald, 2017), helping to deliver high quality gaming. Children are already spending a tremendous amount of time on these DVGs (Prensky, 2007; Sylvén & Sundqvist, 2012; Williams, 2003), which has triggered the idea of using them in language learning among scholars for a few decades now (Kettemann, 1995; Sylvén & Sundqvist, 2012). This attempt is known as game-based learning defined by Tsai and Fan (2013) to be "any initiative that combines or mixes video games and education" (p. 115).

Regarding language learning, 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 than an educational one in which aesthetic features are not focused on. On the other hand, commercial DVGs are not made for language learning purposes, and therefore they do not focus on teaching English for example. 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.

Children and even adults could have many reasons to play DVGs, such as having fun or engaging in virtual societies (Charsky & Ressler, 2011; Griffiths, 1993; Williams, 2003). It may seem a bit abstract to use a commercial DVG for language learning purposes, but any DVG involves a training stage where the basics required for playing that game are laid out. The delivery of these basics is done through textual and audiovisual means. Even after this "training stage," the gamers' skills are continually challenged in novel ways. What is meant is that the gamers are learning things throughout the whole game.

As a teacher, we could look for DVGs that could pace the delivery of new content at an acceptable rate accompanied by adequate audiovisual and textual clues that allow gamers to try and learn some language through them. For example, in a DVG like Defense of the Ancients (IceFrog, 2015), gamers try to buy some items which make their avatars stronger. But there are different classes of avatars which need different items. So how do gamers know what items to buy? Put briefly, gamers pay attention to each item's attributes and how it affects their avatar. They look at the item thumbnails, read its definition, watch what stats are affected by its attributes, and examine it in the gameplay to determine its viability for that avatar (Ebrahimzadeh, 2017; Ebrahimzadeh & Alavi, 2017). In order to do that, they will need to understand the items or, in other words, learn them. As noted, an influential factor to play DVGs is to enjoy. So, can this enjoyment be related to learning outcomes?

1.2 Enjoyment in game-enhanced language learning

Enjoyment, as a word, is an attitude, circumstance, or favorable response to a stimulus that tends to make one gratified or happy (Merriam-Webster, 2014). As a construct, however, it is defined by researchers 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 (2004) conceptualized it as "a general positive disposition toward and liking of media content" (p. 290).

Scholars have encouraged the use of 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). It is reasoned that DVGs 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).

1.3 Enjoyment and game-mediated language learning: Key issues and important studies

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 it 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 when flow is over. 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. It considers enjoyment to be conceptually similar to flow, basing itself, thus, on the same components. However, they added social interaction as an additional component reinforced through competition, cooperation, and connection. Later, Fu, Su and Yu (2009) turned the model into a scale that measures learner enjoyment in e-learning games. Their scale has eight dimensions including concentration, goal clarity, feedback, challenge, autonomy, immersion, social interaction, and knowledge improvement.

Researchers (e.g. Bressler & Bodzin, 2013; Hong et al., 2013) have examined flow experience in DVGs among young students and found that it features a wish for better performance, discovery learning, a flash of intensity, and that flow experience can enhance retention scores indicating that it is likely to reach a state of flow through DVGs. 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. Working with high school students, Dewaele, Witney, Saito and Dewaele (2017) also found higher enjoyment in the foreign language classroom to be related with higher scores on attitudes toward the foreign language, its teacher, and the amount of time spent on speaking it.

1.4 Computer assisted vocabulary learning

Three steps are explained by Nation (2001) 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 to utilize 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 (2001), vocabulary learning software needs to provide the learning conditions noted above (i.e. noticing, retrieval, and generative). Noticing can be harnessed through colorization, text stylization, and highlighting for example. Retrieval may be done through the use and/or repeated use of vocabulary in order to acquire something else or some other item. Finally, generative use pertains to presentation of vocabulary in different forms such as written, spoken, and pictorial. The software-related computer-assisted vocabulary learning issues noted here exist in DVGs, as they are understood as computer software. For example, a DVG can easily provide features that promote noticing (e.g. use of colors, pictures, actions, etc.).

Moreover, researchers like Chapelle (1998) and Warschauer and Healey (1998) have argued that computer assisted language learning can enhance learner independence and autonomy defined by Holec to be "the ability to take charge of one's own learning" (as cited in Cotterall, 2000, p. 109). According to them, the multimedia environment can incorporate learning strategies and learner field dependence/independence. Going over the literature, they identify design features that help promote language learning through the use of computer technology. We will go over some of these and how they work in a DVG in the discussion section.

1.5 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) emphasized language learners' attitudes toward the target language community. The cognitive-situated period (1990s) involved an attempt to coordinate motivation research with the cognitive revolution in psychology. The process-oriented period (turn of the century) viewed motivation as a process occurring through time which should be investigated using longitudinal experiments. 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). For example, the sociocultural theory (Vygotsky, 1978) stresses an individual's active participation in the construction of motivational goals; also, it views what individuals internalize to be the result of this participation – learning (Dörnyei & Ushioda, 2011). Having explained the importance of enjoyment earlier, it 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 activity such as second language learning.

1.6 The aim 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, & Magnant, 2013). Additionally, few empirical studies with a focus on gaming experience and second language development have been done (Cornillie, Thorne, & Desmet, 2012). Furthermore, the bulk of existing studies were done outside the classroom (Thomas, 2012).

From another perspective, new theories on language motivation are assigning a more important role to enjoyment (Dörnyei & Ushioda, 2011). Also, it is known that second language acquisition is a long-term, sustained effort. According to Dörnyei (2007), such an effort can succeed, 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 lifelong commitment to the subject matter. (p. 719)

Having noted its potential for alleviating boredom and disengagement, DVG enjoyment still remains largely uninvestigated. The present study, thus, aimed to address this gap by seeking to answer the following questions. Moreover, we examined this 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

2.1 Participants

Through cluster sampling, 136 Iranian, high school, male students (age 12–18, M = 14.81, SD = 1.45) were selected. The classes were randomly assigned to one of the two treatments, namely, Players (N = 65) and Watchers (N = 71). In each session, the Players were randomly divided into several groups of five students each (the number was 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. Only male participants could be included in the study due to educational policies in Iran. Lastly, participation was voluntary. As such, those who did not want to participate were given handouts on their formal curriculum to practice during the treatments.

2.2 Materials and instruments

2.2.1 The EGameFlow scale

To measure the learners' enjoyment from e-learning, the EgameFlow scale was used (see 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 α calculated by the developers was .942. This study found it to be .885.

Hardcopies of the scale were distributed among the participants, which were then tabulated for data analysis. Each subscale was averaged to calculate the mean score used for analysis. Missing data were treated using the option to 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 any other analysis.

2.2.2 The digital video game

We used IceFrog's (2015) map, named Defense of the Ancients, which could be played through Warcraft III: The Frozen Throne (Blizzard, 2003). The choice was based on the learning opportunities it offered, suitability, GameFlow criteria (Sweetser & Wyeth, 2005), and technical implementation issues (hardware, software, and gameplay training requirements). 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 locate, combine, and 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 of 12 years old and above. Additionally, two well-known online sources on this DVG 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 well 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 (see 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 time limit. Thirdly, we tried to include items with more relevant thumbnails considering their meaning. Fourthly, 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 list 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 interaction with the DVG.

2.2.4 The delayed vocabulary posttest

The delayed vocabulary posttest included 21 multiple-choice questions (four alternatives) on the abovementioned vocabulary items. It was first pretested four weeks before the study began to examine homogeneity. Students had sufficient time to finish this test. All returned the papers within 10 minutes. Four weeks after the end of the course, the same test was administered as a one-month delayed posttest. Table 1 shows the descriptive statistics of the pre- and posttest scores. Lastly, it should be mentioned that five weekly immediate posttests were administered too. Their results, however, were used only for examining vocabulary acquisition, which is not the subject of this paper.

Table 1. Descriptive statistics of the vocabulary pretest and delayed posttest

	N	Minimum	Maximum	Mean	Std. Deviation
Pretest	132	0	20	4.98	4.185
Delayed posttest	132	2	21	14.45	4.080

2.2.5 Researcher field notes

Field notes were made of any special event, behavior, and idea during and after each session (e.g. likes/dislikes, feelings, enjoyment, environment, learning, and out-of-class experiences). These notes were used for data triangulation purposes, as the questions were investigated based on statistical analysis. Thus, wherever feasible, these notes are presented in the discussion.

2.3 Data collection procedure

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

First, the Players 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 joined each game and competed in two

equal groups. Students talked to each other during each session in Persian, as they were not fluent enough to carry out their interactions in English. Only item names were mentioned in English.

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, hitpoints, 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, and the location of an item.

The Watchers followed the same principles in treatment as the Players. However, they just watched two classmates compete through the DVG (the two players were not involved in the statistical analyses run for this paper). To add to the competition, computer controlled teammates and opponents were included. The class was divided into two groups that supported their Players 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 ($p = .01$). 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 to examine the correlations. Moreover, highlights of researcher field notes were viewed, reviewed, categorized, and analyzed for better understanding of the setting, participants, instruments, goals, conceptions, 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 ($M = 14.09$, $SD = 3.95$). Additionally, to show the difference between pretest and posttest scores (as indicated in Table 1), a mixed between-within subjects ANOVA was run, and it showed the main effect for time to be significant ($p = .000$) with a very large effect size (Partial Eta squared = .774), which is to be expected (see Table 1 for mean scores). In other words, there has been a significant change in scores from 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 (separate regression analysis for Players and Watchers were run as a precautionary measure and the results were statistically the same as the ones presented here).

Table 2. Examining homogeneity between the groups

E-learning enjoyment dimensions	t	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 [a]	-1.489	-.26126	.140

[a] Enjoyment as a whole (average score on all the dimensions)

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 squared = .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), autonomy (p = .010), immersion (p = .009), and knowledge improvement (p = .002). While challenge (-.350) and immersion (-.291) had negative correlations with vocabulary learning, autonomy and knowledge improvement showed a positive correlation (Beta = .326 and .388 respectively). In sum, there were four significant predictors, among which two were positively and two were negatively correlated.

Table 3. Coefficients[a] calculated 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

[a] Dependent variable: Delayed vocabulary posttest score

3.2 Discussions

Although weak in power, the enjoyment scale reached statistical significance. The result agrees with the findings of Allen et al. (2014), who also found DVG enjoyment to predict a measure of language learning. Four dimensions were found to have significant contributions, namely, challenge, autonomy, immersion, and knowledge improvement. Two dimensions (challenge and immersion) had negative correlations with vocabulary learning scores.

Challenge is found to be critical when it comes to experiencing enjoyment (Csikszentmihalyi, 1991; Kiili, 2005). It must be adjusted to one's skills so that they would not be bored or exhausted (Kiili, De Freitas, Arnab, & Lainema, 2012). While students enjoyed the class, although some had ideas about other content, it may be that the amount of challenge has not been at a convenient level for all. This can be due to unequal experience with the DVG which may have caused the negative correlation. Random assignment could have also contributed to this, since the more experienced players may not have been distributed evenly. Immersion is an underlying characteristic of DVGs (Prensky, 2007; Rollings & Adams, 2003). The observations showed that immersed students did not exclusively focus on vocabulary. Immersion mostly resulted from the gameplay, audiovisual factors, and competition. 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. This may be why immersion showed a negative correlation.

Autonomy and knowledge improvement positively correlated with the vocabulary posttest scores. The students seem to have become more autonomous. Some students claimed that they re-conceptualized the skills they learned 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. The result agrees with findings of other researchers in that computer-assisted language learning can enhance learner independence (e.g. Chapelle, 1998; Warschauer & Healey, 1998). As for knowledge improvement, the results indicate that students did pick up some new vocabulary. Also, the comfort and enjoyment they experienced helped their learning since it partly relieved them from the serious environment of the school. Furthermore, active student participation in knowledge construction (deciding on Persian equivalents) appears to have affected vocabulary learning.

Concentration, goal clarity, feedback, 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 concentration was not on vocabulary learning but on the gameplay, since a commercial DVG was used. 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 a tool. Concentration, thus, showed a poor negative correlation with learning vocabulary, since it was mainly concerned with winning the game and not the tools used to do it.

Regarding feedback, the students did not pay much attention to the messages or 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 focused on the vocabulary items (e.g. reports on players getting a double kill). 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 button to activate the feedback, but most of the time their cursor was over the main window. Lastly, every so often, the students did not pay much attention to the feedback, as they were in the heat of battle. All these observations help accentuate the essential role of visual feedback, since vocabulary learning seems to have mainly occurred through seeing the vocabulary as an object in action.

Goal clarity and social interaction were positively correlated, though not significantly. Considering the former, the DVG (IceFrog, 2015) 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. Nevertheless, as a means to achieving the primary goal, they facilitated vocabulary learning. Social interaction did not reach statistical significance too. 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 of this dimension 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.

A brief discussion on flow experience and motivation ends this section. Points indicative of flow experience were observed. For example, the sudden interruptions, such as the principal knocking on the door, were most disturbing to the students. Questions such as "why can't he come later?" or "what's the big board out there for then?" were often heard. This points to concentration, immersion, motivation, and engagement, which characterize flow experience (Csikszentmihalyi, 1991). This is

not to equate flow and enjoyment but to indicate their shared underlying concepts further exploring the socio-dynamic phase of studies on motivation (Dörnyei & Ushioda, 2011). It points out some of the internal relationships between the mentioned concepts, which may help guide the fusion of technology into our practice in a calculated manner. This point, however, is in need of further investigation, as the present study only indicated hints regarding this matter. Nonetheless, the findings agree 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 is associated with vocabulary learning. Dörnyei and Ushioda (2011), on the other hand, view enjoyment as an important component of motivation. Thus, enhancing enjoyment through DVGs may help language learning motivation, which in turn helps students keep up through the long, time-consuming effort of second language learning. Accordingly, by making the language learning process enjoyable, practitioners can help learners be more successful and improve their autonomy. Still, determining how effective enjoyment can be requires more studies.

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, namely, Players and Watchers, which showed no significant difference. Although the model reached statistical significance in predicting vocabulary learning scores, it was weak in power. The e-learning enjoyment dimensions of challenge and immersion were negatively correlated, but autonomy and knowledge improvement were positively correlated. By identifying the enjoyment dimensions that were significantly associated with vocabulary learning, the future practice can know how to treat each of them (whether to enhance or control them) in order to improve second language learning. 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 gameplay with different dimensions of enjoyment designed to improve the chances of encountering the target item(s) more often.

The socio-dynamic phase of motivation studies notes enjoyment as an important factor in motivating learners (Dörnyei & Ushioda, 2011). It means that DVG-induced enjoyment may help attract and motivate learners to persist time-consuming tasks such as learning a second language. Thus, game-enhanced language learning seems to be associated with enjoyment experienced by language learners which might enhance their motivation. As noted by Prensky (2003), “a sine qua non of successful learning is motivation: a motivated learner cannot be stopped” (p. 1). Enjoyment, thus, as a significantly correlated factor to vocabulary learning, should be considered, if we are to enhance motivation and promote second language acquisition through game-enhanced language learning. By identifying the more important dimensions of enjoyment, the study hopes to have advanced the current understanding of how enjoyment plays its role in increasing learner engagement. Lastly, the findings of this study can be used to design more effective educational DVGs or select better suited commercial DVGs for vocabulary learning purposes.

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, and also to duplicate the experiment with female students. Furthermore, evaluation of enjoyment in educational DVGs instead of commercial ones is required, as they are believed to more readily lend themselves to learning. Lastly, this is a preliminary study which hopes to pave the way for future, more comprehensive ones.

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Appendices

Appendix A

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

Note: Strongly Disagree (**1**), Disagree (**2**), Somewhat Disagree (**3**), No Opinion (**4**), Somewhat Agree (**5**), Agree (**6**), Strongly Agree (**7**).

No	Item	1	2	3	4	5	6	7
	Concentration (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
	Goal Clarity (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
	Feedback (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
	Challenge (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
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
	Autonomy (3 items)							
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
	Immersion (7 items)							
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
Social Interaction (6 items)								
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
Knowledge Improvement (5 items)								
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	**Item**		**Session**
	English	**Persian**	
1	Damage	آسیب	1
2	Armor	زره	1
3	Agility	چابکی	1
4	Healing salve	مرهم شفادهنده	1
5	Ally	متحد	1
6	Gauntlets of strength	دستکش کوتاه قدرت	1
7	Ironwood branch	شاخه آهنین	2
8	Status	وضعیت	2
9	Intelligence	هوش	2
10	Mana	جادو	2
11	Buckler	سپر کوچک	3
12	Robe of the magi	ردای زرتشتی	3
13	Chainmail	زره زنجیری	3
14	Boots of speed	پوتین سرعت	3
15	Gloves of haste	دستکش بلند شتاب	4
16	Broadsword	شمشیر پهن	4
17	Quarterstaff	عصای جنگی	4
18	Claymore	شمشیر دو دم	4
19	Perseverance	استقامت	5
20	Power treads	گام‌های پرتوان	5
21	Recipe	دستورالعمل	5