# Productive Word Knowledge Development and Its Relation to Informal Contact with English through Various Leisure Activities

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## Abstract

Much of the previous research that has provided evidence for the relationship between engagement in out-of-class activities and vocabulary outcomes has focused on receptive word gains. However, little research has attempted to explore this relationship with productive word knowledge. Additionally, the contribution of various gaming genres to the relationship is particularly underexplored. The present mixed-method study fills these lacunas by employing a productive vocabulary levels test, a questionnaire, and semi-structured interviews to explore the relationship between 35 different leisure activities that English as a foreign language (EFL) learners engage in outside the classroom and their productive vocabulary growth. The study's findings revealed that although learners frequently engaged in different activities, they spent most of their free time gaming, which contributed the most to productive word knowledge learning. Regression analysis showed that two gaming genres, massively multiplayer online role-playing games (MMORPGs) and first-person shooters, significantly predicted productive knowledge of words. Qualitative analysis demonstrated that, in general, the participants had a positive perception of informal engagement with English activities outside formal learning contexts.

## 1. Introduction

The value of vocabulary in the field of second language (L2) research is widely unquestioned as a pivotal predictor of L2 achievement. It has a central role to play in L2 proficiency because insufficient word knowledge hinders L2 communication (Nation, 2022). According to Nation (2006), L2 learners should acquire a voluminous number of word families (at least 6,000–8,000), to read and speak comfortably in English. However, reaching this estimated threshold, is likely to require years of massive exposure to a wide range of diverse types of discourse (Laufer & Vaisman, 2023), and it is unlikely that L2 students can achieve these targets solely through formal traditional classrooms due to limited allocated time for English classes (Peters & Webb, 2018). This has prompted vocabulary researchers to examine the effects of engagement with English outside the class environment on enhancing vocabulary learning (De Wilde et al., 2020).

The rapid advancement and widespread adoption of technology have drastically changed the way L2 learners learn. Today, most L2 learners who own smart phones and tablets are increasingly informally exposed to English outside classrooms through a broad range of activities, including viewing movies and TV shows, playing digital games, and listening to songs. Given the change in learning conditions, a great deal of research attention has been devoted to learning that occurs informally outside formal learning settings. There is now a considerable amount of evidence attesting to the positive effects of engagement in pleasure activities outside school environments on vocabulary development (e.g., De Wilde & Eyckmans, 2017; Ebadi et al., 2023; Laufer & Vaisman, 2023; Lee, 2019; Warnby, 2022). The bulk of published literature has furnished evidence in favor of a positive relationship between receptive vocabulary uptake and engagement with out-of-class activities, yet little is known about the relationship between these activities and productive vocabulary knowledge, except for the findings of Bollansée et al. (2021) and Sundqvist and Wikström (2015). Since productive vocabulary knowledge is as important as receptive knowledge, exploring the relationship between out-of-class pleasure activities and productive vocabulary knowledge would help us to understand the role of these activities in fostering productive vocabulary learning. In addition, the existing studies on extramural English learning have not distinguished between the different video game genres but rather examined various games as one type. The present study was thus carried out with the aim of complementing past studies by exploring the relationship between productive

vocabulary knowledge and engagement with a wide array of out-of-class activities.

## 2. Background

### 2.1 Extramural English

The importance of exposure to the target language to L2 development is unchallenged. Although formal exposure to English in traditional classrooms remains central to L2 development (Kaatari et al., 2023), it is assumed that relying solely on in-school education will not be sufficient to develop L2 proficiency; thus, L2 learners should be exposed to English outside the classroom walls (De Wilde et al., 2020). Given the fact that L2 learners are increasingly engaged in a large array of activities outside the classroom from an early age onwards (De Wilde & Eyckmans, 2017), the past few years have seen a surge in interest in the effects on word learning of the various leisure activities that students do outside school environments. Exposure to diverse types of out-of-school activities has been labeled by Sundqvist (2009) as 'extramural English', a generic term that covers a broad spectrum of leisure activities that occur outside formal traditional classrooms, such as viewing TV, playing video games, listening and reading in English, and using the internet. Despite its common usage, the term 'extramural English' has often been used interchangeably without precision in the literature with other terms including "out-of-class, out-of-school, outside school, extracurricular, after school" (Rød & Calafato, 2023, p. 2). The present study made use of all these terms to describe L2 word learning that occurs beyond school through 35 different activities that students engage in in their spare time.

### 2.2 Vocabulary Growth Through Extramural English

There is now a plethora of published literature on the beneficial relationship between extramural English and different areas of L2 development and educational gains with learners from different backgrounds and age groups. One main strand of research is concerned with the relationship between such activities and L2 vocabulary development, typically drawing on data collected through questionnaires and vocabulary size measures. Generally, a large body of studies has suggested a positive association between engagement in extracurricular activities and the L2 vocabulary learning of learners from various contexts (e.g., De Wilde & Eyckmans, 2017; Laufer & Vaisman, 2023; Lee, 2019; Rød & Calafato, 2023; Sundqvist & Wikström, 2015). However, the results of these studies regarding the influence of distinct kinds of extramural English activities on learners' vocabulary size have been somewhat inconsistent and contradictory (Kaatari et al., 2023). Some studies have observed a positive association between viewing non-subtitled TV programs and learners' vocabulary knowledge (Peters, 2018; Tam & Reynolds, 2022), whereas others have detected a stronger correlation between online reading and vocabulary size (Laufer & Vaisman, 2023). Other researchers (De Wilde et al., 2020), however, have found that digital gameplay and the use of social media significantly contribute more to vocabulary development than other types of extracurricular activities.

One of the most frequent out-of-school activities that many L2 students of all ages and backgrounds engage in is gaming (Laufer & Vaisman, 2023; Sylvén & Sundqvist, 2012). Digital games, which can be played on different platforms and devices, are said to be linguistically rich environments that have been documented to be beneficial for L2 skill development (Sylvén & Sundqvist, 2012). L2 learners, who can play with all kinds of people from around the world simultaneously, are provided with a plethora of opportunities to encounter authentic English and learn in a fun and dynamic way. Today, there is a comprehensive list of digital game genres available on the gaming market, some with several more subgenres (e.g., action games, role-playing games, MMORPGs, sports games, strategy games, simulation games, and first-person shooter games, to name just a few), bringing gamers from different societies and cultures together. These genres are distinguished according to their gameplay interactions. Some games (i.e., MMORPGs) require active communication using L2 with gamers from around the world. This is argued to be especially effective for L2 acquisition (Sylvén & Sundqvist, 2012) as gamers are forced to "operate within, but at the outer edge of, the learner's resources" (Gee, 2007, p. 67). Dixon and Christison (2018) explain that some games (e.g., *League of Legends*, *Call of Duty*, *World of Warcraft*, *Star Wars*, and *Final Fantasy XIV*) allow gamers to interact meaningfully with other gamers using audio and written chat functions, increasing the opportunities for L2 learning and practice, while others (e.g., *Resident Evil* and *The Witcher 3*) have fewer opportunities for interactions between players.

Several studies have looked at the potential relationship between gaming and vocabulary learning, indicating a positive relationship between the amount of time spent on gaming and vocabulary growth of L2 learners (De Wilde et al., 2020; Sylvén & Sundqvist, 2012; Sundqvist & Wikström, 2015). These studies have established that learners who frequently play digital games, particularly MMORPGs, achieve higher vocabulary scores than those who play less frequently. However, much of the past research did not distinguish between the various game genres, but rather treated them all as one broad category (gaming) or classified digital games based on their

hardware platforms (i.e., phone game playing, computer game playing, and console) (e.g., Bollansée et al., 2021; Tam & Reynolds, 2022). Despite the prevalence of various digital game genres, no single study exists that adequately examines the affordances of the different genres for vocabulary development. Since game genres are versatile in their properties and functions, examining the potential relationship between the top game genres (i.e., MMORPGs, first-person shooters, and action-adventures) and vocabulary learning seems to be particularly important, and is the focus of the present study.

Other popular extracurricular activities, such as watching television, using social media, reading, and listening, have also been put forward as potentially effective sources for vocabulary development (Peters, 2018). Numerous studies have produced interesting findings in favor of the beneficial effects of these activities on lexical item development (e.g., Alshumrani, 2023; Fievez et al., 2021; Pattemore & Muñoz, 2023). What all these studies indicate is that engagement in extramural English activities contributes to vocabulary learning and that exposure to input outside of school is necessary to enlarge learners' vocabulary knowledge.

Thus far, most publications that have established links between involvement in out-of-class activities and vocabulary learning have focused on learners' receptive word knowledge (Laufer & Vaisman, 2023; Tam & Reynolds, 2022; Warnby, 2022). Surprisingly, very little can be found in the literature on the relationship between out-of-class activities and productive knowledge (Bollansée et al., 2021; Sundqvist & Wikström, 2015). The distinction between receptive and productive word knowledge is particularly relevant and important, as both carry the same importance in classifying word knowledge (Nation, 2022). It is often assumed that learners' productive knowledge is much smaller than their receptive knowledge (Milton, 2009) and that the bulk of vocabulary is mastered at a receptive level (Webb, 2005). Additionally, the literature on vocabulary size and knowledge includes more receptive tests than productive ones (Sonbul et al., 2022). Since engagement in extramural English has proved useful for boosting receptive vocabulary knowledge, it is worth looking at whether its beneficial association can extend to the development of productive knowledge. Research exploring the role of engagement with out-of-school English in productive knowledge growth should provide further important insights into this issue. In addition, the existing literature has not classified digital games by genre and thus our knowledge of the effects of various genres remains rudimentary. The present investigation aims to extend our knowledge of the potential association between exposure to different leisure activities and productive word growth by examining a comprehensive list of extramural English activities ($n$ = 35) that EFL learners are exposed to outside their traditional English classrooms.

### 2.3 The Present Study

In reviewing the literature, a number of notable lacunas have been identified, which point to the need for further rigorous research to address them. This mixed-method study was designed to generate fresh insight into the relationship between productive vocabulary uptake and engagement in distinct types of out-of-school activities. Specifically, the study focused on seven broad categories of leisure activities that EFL learners might be exposed to outside the school walls (i.e., listening to English, watching television series and movies, reading in English, engagement with social media with English content, and playing various digital games). This investigation sought to answer the following research questions:

RQ1: Which leisure activities are EFL learners frequently engaged in?

RQ2: Does engagement in the examined categories of leisure activities have a correlation with learners' productive vocabulary knowledge?

RQ3: Which of the three gaming genres – MMORPG, first-person shooter, or action-adventure – has the greatest potential for fostering learners' productive vocabulary development?

RQ4: How do learners perceive the learning potential of different categories of leisure activities?

## 3. Method

### 3.1 Participants

In this research, data were collected from 120 voluntarily participating male EFL learners, aged between 18 and 21 years old, who were recruited from a key faculty of a major university in the western part of Saudi Arabia. The host faculty offers a wide range of career-oriented diploma programs, including marketing, cyber security, graphic design, banking, and insurance. All the participants were native Arabic speakers and in the first year of their professional diploma programs. During this year, the students had to study three intensive English courses (ACE 101, ACE 102, and ACE 103) offered over three trimesters and running for 15 hours per week. By the time the data were collected, the participants were undertaking the third level of the intensive English course (ACE 103), in addition to other compulsory major-related modules. Based on their overall marks gained in the

English courses, the participants' level of English was considered B1. Of the participating 120 learners, 87.72% reported they had not been to an English-speaking country to study English.

*3.2 Instruments*

1) Productive word measure

The participants' productive word knowledge was measured using the most popular and extensively adopted productive vocabulary levels test, that by Laufer and Nation (1999). The test was developed with the aim of assessing English language learners' ability to produce a target English word that is semantically appropriate in a contextualized sentence. It provides an estimate of the test-taker's productive vocabulary knowledge at five frequency levels ($2^{nd}$, $3^{rd}$, $5^{th}$, Academic Word List, and $10^{th}$). With 18 items tested at each of the five levels, the test is in a gap-fill format where a contextualized sentence is presented and a particular missing target word is left incomplete. The testes, who are given the first letters of the to-be-completed target word to counteract the chances of unpredictable responses, are required to read the sentence and produce the missing letters of the target word. Owing to possible test fatigue, only the first three levels ($2^{nd}$, $3^{rd}$, and $5^{th}$) were employed in the present study. Dichotomous scoring was followed with 0 for wrongly supplied words and 1 for correct answers. Testes were not penalized for minor spelling errors.

2) Extracurricular activities questionnaire

To measure the participants' engagement in various leisure activities, the questionnaire by Tam and Reynolds (2022) was adapted for this investigation. The response scale questionnaire was modified from a measure of frequency (0 to 9 hrs) to a 5-point scale (1 for never to 5 for always). Prior to administering the questionnaire, the researcher collected preliminary data from a sample of the participants ($n = 30$) to explore their weekly exposure to different activities. In light of that information, additional questionnaire items were added to the modified questionnaire to distinguish between distinct game genres (i.e., MMORPG, first-person shooter, and action-adventure). The questionnaire comprised two parts. The first one served to gather personal information about the respondents (i.e., experience of studying English in an English-speaking country, their scores on English standardized tests, and age). The second part, with 35 closed-ended items, inquired about the participants' engagement in various pleasure out-of-class activities. The 35 questionnaire items were divided into five parts based on their relevant category: (1) the first part tapped into the participants' exposure to TV shows and movies; (2) the second part focused on their engagement in reading English materials; (3) the third part looked at the frequency of listening to English materials; (4) the fourth section explored their engagement in social media with English content; and (5) the last part, with the largest number of questions, asked about the frequency of digital gaming. This part was further divided into three subdivisions based on game genres: MMORPGs, first-person shooters, and action-adventure games. The respondents were asked to estimate their participation in each activity on the basis of the number of hours spent on each activity per week (ranging from 1= never/no engagement to 5 = always for 10 + hours of engagement). The online questionnaire was distributed to the learners through various means, including the MyKAU App (the official hosted university mobile application for communications between instructors and students), emails, and WhatsApp.

3) Interviews

The use of a qualitative instrument is vindicated as it allowed the researcher to explore the feelings, perceptions, and expectations of English language learners, providing insights into the lived experience of the interviewees (Seidman, 2013). In this study, semi-structured interviews were conducted to uncover the participants' opinions and perceptions of vocabulary learning through informal engagement in leisure activities. A subset of participants ($n = 10$) who voluntarily consented to take part in the interviews were invited for face-to-face interviews. The transcribed interviews were thematically analyzed.

*3.3 Procedure*

This study was carried out during the third trimester of the academic year 2023 over five consecutive days. On the first day, the participants were given a detailed explanation about the purpose of the research and how to participate in the study, and then they completed the consent form. On the second day, they completed the vocabulary measure test, which took them over one hour to complete. On the third day, they filled out the electronic questionnaire. The last two days were designated for the interviews. To ensure a good understanding of the test and questionnaire questions and items, the researcher supervised the process of data collection.

*3.4 Findings*

1) Quantitative findings

Table 1. Descriptive statistics for the vocabulary test

| Levels of the Test | Mean (SD) | Minimum | Maximum |
| --- | --- | --- | --- |
| 2nd | 16.16 (1.04) | 5 | 18 |
| 3rd | 10.46 (2.98) | 3 | 16 |
| 5th | 6.07 (3.81) | 0 | 9 |

*Note*. The maximum possible score at each frequency band is 18.

As a first step, a descriptive analysis of the scores reported in the vocabulary measure was conducted for all the participants (Table 1). The data in Table 1 demonstrate a broad range of test scores across the three levels. Specifically, there was a consistent drop in scores from the 2nd level to the 3rd and 5th levels. The participants' means were higher for the most frequent 2,000 words ($M = 16.16$) than for the most frequent 3,000 words ($M = 10.46$). The lowest means were gained from the 5,000-word level ($M = 6.07$). The highest maximum score (18) was achieved at the 2nd level, while the lowest score (9) was reported at the 5th level.

Table 2. Frequencies of activity categories

| Activity categories | Mean | SD |
| --- | --- | --- |
| Listening | 3.66 | .89 |
| Reading | 1.25 | .52 |
| Viewing | 7.43 | 1.52 |
| Social media | 8.38 | 1.75 |
| MMORPG games | 12.88 | 1.35 |
| First-person shooter games | 12.50 | 1.48 |
| Action-adventure games | 12.01 | .88 |

*Note*. A total of 35 activities divided into their respective categories.

For the simplicity of the analysis, descriptive statistics for the 35 activities over the subparts of the questionnaire were calculated for each participant and assigned to the respective overarching categories (listening, reading, viewing, social media, gaming genre one, gaming genre two, and gaming genre three). Descriptive statistics of how long the participants were engaged in the seven main categories of extramural English activities per week are reported in Table 2. The table shows that regardless of the activity type, the participants regularly participated in a range of leisure activities outside the classroom. However, the level of engagement varied considerably. The learners were involved most frequently in gaming, with MMORPG games being the most played ($M = 12.88$), whereas reading was the least favored activity outside the school ($M = 1.25$). First-person shooter games ranked as the second most frequent and regular out-of-class activity ($M = 12.50$), followed by action-adventure games ($M = 12.01$).

After gaming, on average, the participants spent an average of $M = 7.43$ hours of their spare time watching television outside the university. They also engaged with English through social media, spending an average of $M = 8.38$ hours. Regarding engagement in various social media platforms, the participants reported regular involvement, with a mean average of 8.38 hours per week. Overall, the data presented in Table 2 suggest that the participants engaged in various pleasurable activities in their spare time.

Table 3. Correlations between seven categories of activities and scores on productive vocabulary levels test

| Categories of Activities (total = 35 activities) | Productive Vocabulary Levels Test |
| --- | --- |
| Listening | .059 |
| Reading | .120 |
| Viewing | .167 |
| Social media | .157 |
| MMORPG games | .494** |
| First-person shooter games | .492** |
| Action-adventure games | .393** |
| Overall extramural English activity | .201* |

*Note*. * $p < .05$, ** $p < .01$.

The relationship between the seven categories of the 35 leisure activities and learners' scores on the vocabulary measure was examined using nonparametric Spearman's rho correlations. As presented in Table 3, the scores on the productive vocabulary levels test were found to have moderate correlations with the number of weekly hours spent playing MMORPG games, $r$ (118) = .494, $p$ = . 001; first-person shooter games, $r$ (118) = .492, $p$ =. 001; action-adventure games, $r$ (118) = .393, $p$ =. 001; and overall extramural English activity $r$ (118) = .201, $p$ =. 028.

Table 4. Regression analysis

|  | B | Standard Error | β |
|---|---|---|---|
| Intercept | 20.53 | 12.630 |  |
| MMORPG games | .349 | .091 | .683* |
| First-person shooter games | 1.41 | .58 | .231* |
| Action-adventure games | .036 | .104 | -.057 |

*Note.* $*p < .05$.

The third research question explored the extent to which three game genres – MMORPGs, first-person shooters, and action-adventures – could predict learners' productive word knowledge. The results of the multiple regression analysis are displayed in Table 4. It was found that the model explained 42% of the variance in the learners' productive vocabulary outcomes ($R^2$ = .419, F (3, 116) = 7.83, $p$ < .001), with MMORPG games significantly contributing the greatest explanatory power to the prediction (β = .683, $p$ < .05), followed by first-person shooter games (β = .231, $p$ < .05).

2) Qualitative findings

With the intention of gaining a deeper understanding of how the participants perceived vocabulary learning through the variety of leisure activities they do outside the classroom, three open-ended questions were prepared. The first question asked the participants about their perceptions of engagement in the 35 activities. Overall, the participants held positive views toward these activities, with 90% finding them an interesting and enjoyable experience. Some commented:

> Learning inside the classroom is not enough to develop good English due to several issues. I really enjoy involving myself in these activities outside the classroom, especially gaming and movies. I find them interesting and useful.

> Because I use my phone more than eight hours a day, I practice English and learn something new through games, Twitch, and Twitter. I find myself more comfortable and less anxious compared to classrooms.

Across all the participants, it was evident that they spent a significant amount of their spare time playing digital games, watching *Netflix*, using social media, and listening to music. While many engaged in these activities purely for entertainment, the majority recognized that they also contributed to their English language skills. The second open-ended question was concerned with the participants' views regarding the effects of the 35 activities on their vocabulary learning. The interviewees, on the whole, agreed that involvement in extramural activities can result in vocabulary development. They believed that their vocabulary learning had benefited a great deal from their constant engagement in various activities. In particular, some participants clearly stated that digital games are excellent opportunities for them to learn novel words and practice what they have learned with other gamers overseas. Some of the participants' remarks were:

> I play these games as a duo (two players) or a team (three players or more). In most cases, the people in these games come from different nationalities, thus communication in English becomes crucial to win the game. I learn all game-related words so I can communicate with other players.

> I need to read long descriptions of items or places on the map. Also, I listen to instructions from the non-player characters (NPCs) to finish quests or achieve goals which are an important part of the playthrough. Sometimes I need assistance from other players or guilds to finish objectives. So, I learn unfamiliar words to advance in the game.

> All communication in these games (such as *Call of Duty* or *Overwatch*) is done through in-game voice chat mostly with non-Arabic players. So, I use the words that help me progress in the games.

The overwhelming majority of informants emphasized the importance of learning and practicing words in gaming. This is because some games, such as *PUBG*, *Fortnite*, or *League of Legends*, involve a team of players where the language of communication is mostly English. They find themselves motivated to learn all the

essential words that enable them to fully engage in such games. The third interview question sought the interviewees' perceptions of learning English outside the classroom through the investigated activities, compared to formal classroom learning. Many participants were initially reluctant to discuss the role of teachers in enhancing and improving their English learning. However, they expressed dissatisfaction with the implemented teaching styles and curriculum. They reported that they improved their English more outside the classroom through movies/shows and video games, as they enjoyed these activities. Some interviewees stated that they found their experiences of informal learning outside of school to be more effective in boosting their L2 skills than formal classroom instruction. They attributed most of their English learning outcomes to extramural activities. For example, two interviewees mentioned:

> I feel less anxious outside the classroom, so I practice English with other gamers who are from the US or UK.

> I learned my English from movies and video games. I speak broken sentences without the fear of facing unpleasant remarks from peers or teachers.

Overall, these findings provide essential insights into the role of informal exposure to English through a variety of leisure activities occurring outside the school walls in the development of L2 words.

## 4. Discussion

Studies on the relationship between engagement in leisure activities outside the traditional school environments and students' productive vocabulary learning are still in their infancy. Additionally, there is a dearth of research investigating the effects of various game genres on vocabulary outcomes. This research intended to fill these lacunas by examining the association between growth in the participants' productive lexical item knowledge and the amount of contact with English outside the formal school walls, through 35 different leisure activities. It also investigated the extent to which vocabulary gains were significantly predicted by game genres.

With reference to the first research question, it is clear from the descriptive findings that EFL learners frequently engage in English through various out-of-class leisure activities, mainly by playing digital games, watching films and series, and using social media platforms in their free time. Specifically, the qualitative data revealed that the participants, who held positive perceptions toward out-of-class activities, reported that they spent substantial amounts of their spare time on these activities. In accordance with the present findings, earlier research has reported that L2 learners with different first-language backgrounds from various age groups – children (Jenson, 2017; Sundqvist & Sylvén, 2014), adolescents (Ebadi et al., 2023; Laufer & Vaisman, 2023; Rød & Calafato, 2023) and mature students (Lu & Dang, 2023) – were frequently involved in different extracurricular activities. These interesting findings lend further support to the claim that regular and frequent contact with English beyond traditional classrooms is beneficial for L2 learning (Sylvén & Sundqvist, 2012).

Consistent with Bollansée et al. (2021), this study revealed that the amount of time spent on pleasure activities outside school varied, with, as expected, gaming being the most common activity, followed by watching movies and using social media. However, the participants reported infrequent and irregular engagement in reading outside the classroom. The mean average of time spent on reading per week was 1.25 hrs, which was the lowest of all the activities included in the study. This finding is inconsistent with Lu and Dang's (2023) results, which found that Chinese EFL learners were most frequently involved in reading. This inconsistency could be attributed to the participants' distinct educational levels. Unlike the participants of the present study, who were recruited from diploma programs in which the need for reading seems to be low, Lu and Dang's (2023) study involved postgraduates, who were more motivated to read because this helped them to cope with the demands of their postgraduate studies.

The correlational analysis for the second research question showed that the development of productive vocabulary knowledge was significantly related to the amount of time spent playing MMORPG, first-person shooter, and action-adventure games, all with medium effect sizes. This finding corroborates past findings that have reported the positive effects of gaming on word development. For example, Rankin et al. (2006) showed that playing MMORPGs significantly impacted their university-level participants' word learning. Interestingly, in communication with the interviewees during the interviews, some reported that they favored involvement in gaming the most and spent a considerable amount of their spare time playing video games. They indicated that they were very enthusiastic about the development of their vocabulary knowledge in order to progress more through the game. What is surprising, however, is that the number of hours the learners spent doing other leisure activities per week was not directly predictive of performance in the vocabulary test, which contradicts the findings of former research (e.g., Bollansée et al., 2021). This rather contradictory finding may be due to the type of vocabulary test employed. Unlike the study of Bollansée et al. (2021), which adopted a productive vocabulary

test that was in a multiple-choice format, requiring the participants to receptively choose the correct picture from among four pictures that represented the tested item, the present study used Laufer and Nation's (1999) productive vocabulary levels test, where active recall of meanings was required.

The regression analysis showed that the three different gaming genres were the main sources that contributed to vocabulary outcomes. This is in line with the findings of several studies (Rød & Calafato, 2023; Sundqvist & Wikström, 2015) which reported that gaming had a potential impact on participants' word development. Specifically, it was found that MMORPGs offered the greatest affordances for productive word knowledge uptake, followed by first-person shooter games. Dixon and Christison (2018) suggested that some video games "allow for anonymity and real-time interaction with a large native speaker population, which is not possible in traditional L2 classrooms" (p. 247). Apparently, the purposeful interaction and authentic communication with other gamers and the game-embedded narratives offer gamers ample opportunities not only to acquire new words but also to practice the learned ones (De Wilde & Eyckmans, 2017).

## 5. Limitations and Conclusion

This study has suffered from a few limitations that merit attention from future researchers. Firstly, the scope of the study was limited in terms of the proficiency level (B1) of the recruited learners. Future research should involve learners of various proficiency levels as that may generate interesting findings. Furthermore, several potential predictors (e.g., learners' self-efficacy, motivation, gender, and aptitudes) that may impact the extent of learning through extramural English (Rød & Calafato, 2023) were not taken into account in the present investigation and should be included in future research. Another limitation of this research is the vocabulary test used. The study employed a productive vocabulary size level measure (Laufer & Nation, 1999), which has been widely adopted as a powerful instrument for measuring the productive vocabulary size of learners. However, it does not capture the actual extent of lexical items gained from various activities (Laufer & Vaisman, 2023). Therefore, further research is needed to develop more rigorous vocabulary tests to obtain more accurate information about the extent of vocabulary learning that has taken place via out-of-class activities.

Despite the above-highlighted limitations, the study strives to improve on past studies in two significant ways. Firstly, it adds to the scarce body of research by focusing on EFL learners' productive word knowledge growth and its relation to informal exposure to 35 distinct leisure activities that occur outside the traditional language classroom. Secondly, the study is the first to shed light on the predictive roles of top game genres (MMORPG, first-person shooter, and action-adventure) in enhancing productive lexical item knowledge. It is clear from the findings that the participants were regularly and frequently engaged in numerous pleasure activities outside of the classroom and that they generally held positive attitudes toward the affordances of such activities for L2 word development. However, the results revealed, unexpectedly, that learners' performance in the productive test significantly correlated with gaming and the overall level of extramural activity. The other overarching categories of activities did not contribute to the development of productive vocabulary knowledge. In sum, this research highlights the importance of exposure to English outside the classroom through different video game types for productive vocabulary growth.

## References

Alshumrani, H. (2023). The learning potential of a tv series in promoting l2 incidental learning of idiomatic and non-idiomatic phrasal verbs. *Journal of Language and Education*, *9*(3), 12–23. https://doi.org/10.17323/jle.2023.17302

Bollansée, L., Puimège, E., & Peters, E. (2021). 'Watch out! Behind you is the enemy!' An exploratory study into the relationship between extramural English and productive vocabulary knowledge. In V. Werner & F. Tegge (Eds.), *Pop culture in language education* (pp. 199–214). Routledge. https://doi.org/10.4324/9780367808334-15

De Wilde, V., Brysbaert, M., & Eyckmans, J. (2020). Learning English through out-of-school exposure: Which levels of language proficiency are attained and which types of input are important? *Bilingualism: Language and Cognition*, *23*, 171–185. https://doi.org/10.1017/S1366728918001062

De Wilde, V., & Eyckmans, J. (2017). Game on! Young learners' incidental language learning of English prior to instruction. *Studies in Second Language Learning and Teaching*, *7*(4), 673–694. https://doi.org/10.14746/ssllt.2017.7.4.6

Dixon, D., & Christison, M. (2018). The usefulness of massive multiplayer online role playing games (MMORPGs) as tools for promoting second language acquisition. In J. Perren, K. Kelch, J.-S. Byun, S. Cervantes & S. Safavi (Eds.), *Applications of CALL theory in ESL and EFL environments* (pp. 244–268).

Hershey, PA: IGI Global. https://doi.org/10.4018/978-1-5225-2933-0.ch014

Ebadi, S., Amini, Z., & Gheisari, N. (2023). On the relationship between mobile-based extramural activities and vocabulary development of EFL learners: A mixed-method study. *Smart Learn. Environ.*, *10*, 33. https://doi.org/10.1186/s40561-023-00252-y

Fievez, I., Montero Perez, M., Cornillie, F., & Desmet, P. (2021). Promoting incidental vocabulary learning through watching a French Netflix series with glossed captions. *Computer Assisted Language Learning*, *36*(1–2), 1–26. https://doi.org/10.1080/09588221.2021.1899244

Gee J. P. (2007). *What video games have to teach us about learning and literacy* (2nd ed.). New York, NY: Palgrave Macmillan.

Jensen, S. H. (2017). Gaming as an English language learning resource among young children in Denmark. *Calico Journal*, *34*, 1–19. https://doi.org/10.1558/cj.29519

Kaatari, H., Larsson, T., Wang, Y., Acikara-Eickhoff, S., & Sundqvist, P. (2023). Exploring the effects of target-language extramural activities on students' written production. *Journal of Second Language Writing*, *62*. https://doi.org/10.1016/j.jslw.2023.101062.

Laufer, B., & Nation, I. S. P. (1999). A vocabulary-size test of controlled productive ability. *Language Testing*, *16*(3), 33–51. https://doi.org/10.1177/026553229901600103

Laufer, B., & Vaisman, E. E. (2023). Out-of-classroom L2 vocabulary acquisition: The effects of digital activities and school vocabulary. *Modern Language Journal*, *107*, 854–872. https://doi.org/10.1111/modl.12880

Lee, J. S. (2019). Informal digital learning of English and second language vocabulary outcomes: Can quantity conquer quality? *British Journal of Educational Technology*, *50*(2), 767–778. https://doi.org/10.1111/bjet.12599

Lu, C., & Dang, T. N. Y. (2023). Effect of L2 exposure, length of study, and L2 proficiency on EFL learners' receptive knowledge of form – meaning connection and collocations of high-frequency words. *Language Teaching Research*, 0(0). https://doi.org/10.1177/13621688231155820

Milton, J. (2009). *Measuring Second Language Vocabulary Acquisition*. Bristol: Multilingual Matters. https://doi.org/10.21832/9781847692092

Nation, I. S. P. (2022). *Learning vocabulary in another language* (3rd ed). Cambridge University Press. https://doi.org/10.1017/9781009093873

Nation, P. (2006). How large a vocabulary is needed for reading and listening? *Canadian Modern Language Review*, *63*(1), 59–82. https://doi.org/10.3138/cmlr.63.1.59

Pattemore, A., & Muñoz, C. (2023). The effects of binge-watching and spacing on learning L2 multi-word units from captioned TV series. *The Language Learning Journal*, *51*(4), 401–415. https://doi.org/10.1080/09571736.2023.2211614

Peters, E. (2018). The effect of out-of-class exposure to English language media on learners' vocabulary knowledge. *International Journal of Applied Linguistics*, *169*(1), 142–168. https://doi.org/10.1075/itl.00010.pet

Peters, E., & Webb, S. (2018). Incidental vocabulary acquisition through viewing L2 television and factors that affect learning. *Studies in Second Language Acquisition*, *40*(3), 551–577. https://doi.org/10.1017/S0272263117000407

Rankin, Y., Gold, R., & Gooch, B. (2006). 3D role-playing games as language learning tools. In E. Gröller & L. Szirmay-Kalos (Eds.), *Proceedings of Euro Graphics* (vol. 25, pp. 33–38). Oxford, UK: Blackwell Publishing.

Rød, A. J., & Calafato, R. (2023). Exploring the relationship between extramural English, self-efficacy, gender, and learning outcomes: A mixed-methods study in a Norwegian upper-secondary school. *Studies in Educational Evaluation*, *79*. https://doi.org/10.1016/j.stueduc.2023.101302.

Seidman, I. (2013). *Interviewing as qualitative research: A guide researchers in education and the social sciences* (4th ed.). New York, NY: Teachers College Press.

Sonbul, S., El-Dakhs, D. A. S., & Masrai, A. (2022). Second language productive knowledge of collocations: Does knowledge of individual words matter? *Studies in Second Language Acquisition*, *45*(2), 480–502. https://doi.org/10.1017/S0272263122000341

Sundqvist, P. (2009). *Extramural English matters—Out-of-school English and its impact on Swedish ninth graders' oral proficiency and vocabulary*. Unpublished doctoral thesis. University of Karlstad, Sweden.

Sundqvist, P., & Wikström, P. (2015). Out-of-school digital gameplay and in-school L2 English vocabulary outcomes. *System*, *51*, 65–76. https://doi.org/10.1016/j.system.2015.04.001

Sylvén, L. K., & Sundqvist, P. (2012). Gaming as extramural English L2 learning and L2 proficiency among young learners. *ReCALL*, *24*(3), 302–321. https://doi.org/10.1017/S095834401200016X

Tam, H. I., & Reynolds, B. L. (2022). The relationship between extramural English engagement and the vocabulary size of L1 Cantonese speakers in Macau. *International Journal of Applied Linguistics*, *174*, 49–82. https://doi.org/10.1075/itl.21003.tam

Warnby, M. (2022). Receptive academic vocabulary knowledge and extramural English involvement–Is there a correlation? *International Journal of Applied Linguistics*, *173*(1), 120–152. https://doi.org/10.1075/itl.21021.war

Webb, S. (2005). Receptive and productive vocabulary learning: The effects of reading and writing on word knowledge. *Studies in Second Language Acquisition*, *27*(1), 33–52. https://doi.org/10.1017/S0272263105050023

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