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Unleashing the power of pixels: Digital gaming as an unconventional catalyst for spontaneous language learning in an EFL environment

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ABSTRACT

In the past two decades, the use of digital games has seen an exponential rise, thanks to the widespread availability of Personal Computers (PCs) and mobile devices. These games have not only provided entertainment but have also demonstrated both positive and negative effects on players. While numerous studies have explored the impact of digital games on attention span, concentration, and addiction, there has been little research on their influence on incidental foreign language acquisition. To address this research gap, a researcher conducted a three-month longitudinal observational study during the post Covid-19 pandemic in 2022. The goal was to investigate how digital games played by young learners for leisure at home affected their unintentional acquisition of English as a foreign language. The participants in the study were between 8 and 14 years old, and three popular games—Free Fire, Minecraft, and Among Us—were included in the experiment. The results of the study shed light on the significant impact of digital gaming on participants' vocabulary development, highlighting gaming as a valuable asset for foreign language acquisition. Furthermore, the players displayed a remarkable ability to retain the newly acquired vocabulary. However, two drawbacks were identified. Firstly, the prolonged screen time associated with gaming raised concerns. Secondly, the vocabulary acquired was often specific to certain areas within a particular game, limiting its transferability to broader language contexts. This study serves as a catalyst for further research, encouraging exploration of the benefits and drawbacks of using digital games for targeted aspects of foreign language acquisition, such as cognitive skill development and enhanced comprehension. By delving deeper into these areas, researchers can gain a better understanding of how digital games can be optimized to foster effective language learning experiences. Ultimately, this knowledge will contribute to the design of educational games that leverage the potential of digital technologies to facilitate language acquisition and promote a holistic learning experience for young learners.

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1. Introduction

In the past decade, the popularity of gaming has skyrocketed, with nearly everyone having access to computers or mobile devices. These devices have become a common means of education, entertainment, and communication, particularly among the younger generation (Li et al., 2022). The younger population is especially drawn to gaming due to their innate need for play and the easy accessibility of digital devices (Khazaie & Derakhshan, 2021). Recent studies (e.g., Čábelková et al., 2020; Donati et al., 2021; Du et al., 2021; Leonhardt & Overå, 2021; Jang et al., 2021) have examined the impact of gaming on various aspects of second language foreign language acquisition, including cognitive abilities, psychological well-being, creativity, social interaction, isolation, and communicative competence. Additionally, prior research has demonstrated the effectiveness of virtual reality in enhancing foreign language acquisition (Pinto et al., 2021).

Digital media and computer games present both challenges and threats to mental well-being and the development of social connections, particularly among children and high school students (Cabeza-Ramírez et al., 2021; Chamarro et al., 2020; Chung et al., 2020; Lin et al., 2021; Richard et al., 2021; Qasim, 2021). While negative aspects of digital media have been extensively studied (Riley et al., 2021), there is a dearth of research on the role of digital gaming in foreign language acquisition and its advantages and disadvantages. To address this gap, this study aims to analyze the impact of digital gaming on incidental English Foreign Language acquisition among younger players, specifically those aged between 8 and 14 years old, who are typically primary school students with a penchant for gaming. It is important to note that incidental Foreign Language acquisition refers to the acquisition of a second language without the primary intention of language learning through formal education. While the implementation of language games in the classroom has become a trend (Li, 2019), the participants in this study were not required to play language-specific games aimed at improving language skills. Instead, they played games solely for entertainment purposes. The study examines the influence of digital gaming on the participants' incidental Foreign Language acquisition based on Gros's (2007) four fundamental aspects of learning through digital games: 1) the study's context, 2) the activities undertaken, 3) the communication between participants and the role of the teacher (observer), and 4) the qualities of the game itself, including its critical and reflective elements. These aspects guided the analysis of the collected data.

The realm of electronic gaming has undergone a remarkable evolution, beginning in the early 1970s and gaining significant traction throughout the 1980s, particularly within the business domain. However, it is in the past decade that this field has experienced an exponential surge, with a notable shift towards simulations rather than conventional games. The emergence of scholarly discourse on digital gaming can be traced back to pioneering works such as "Mind at Play" by Loftus and Loftus (1983) and "Mind and Media" by Greenfield (1996), which marked the initial academic efforts to explore the world of digital gaming. As the field gradually expanded, resource sites like Ludology, Game-culture, Game-research, and Joystick provided valuable insights and resources for researchers. In 2001, Prensky's book "Digital Game-Based Learning" shed light on the intersection of training, simulation, and digital gaming (Prensky, 2001). However, it was the sponsorship of the Serious Games initiative by Woodrow Wilson in 2002, followed by the Serious Games Summit in 2004, that truly propelled the growth of game-based learning research. Egenfeldt-Nielsen's work in 2005 further explored the convergence of game generations and learning theories in the educational domain (2005).

Within the literature on digital games, it is crucial to examine two broad areas: general learning and teaching practices and the specific context of learning and teaching English as Foreign Language. In terms of general education, research has focused on three main trends: the sociological approach, which investigates the use of games in interpersonal relationships and social development; digital literacy; and game-based learning in schools. Turning to the acquisition of English in non-instructional settings, studies have shown positive effects on vocabulary size and English proficiency test scores when learners engage with the language through digital games (Derakhshan & Shakki, 2019; Sundqvist, 2009; Sylvén & Sundqvist, 2012; Al-Obaydi, 2021). This finding is of great significance considering that English has become the language of technological advancement and global media communication (Alzeebaree & Hasan, 2020). The ubiquity of English, especially in IT and business contexts, contributes to its unintentional acquisition through constant exposure and immersion (Klimova & Pikhart, 2021; Ortiz-Marcos et al., 2020). (Sutrisno, 2016b) notes that learners encounter English outside the confines of the classroom due to its omnipresence in technology. De Wilde,

Brysbaert, and Eyckmans (2020) found that children experienced varying degrees of improvement in language skills, with gaming, social media usage, and speaking being the most effective sources of input. These interactive and multimodal forms of input require language production, aligning with the notion that language proficiency tests assess similar aspects.

Reviewing empirical studies on the impact of gaming on vocabulary learning, Chen and Hsu (2020) investigated the use of a serious game titled "Slave Trade" to examine vocabulary and history knowledge acquisition simultaneously. The study involved 66 college English as a foreign language (EFL) students and revealed statistically significant improvements in both vocabulary and history knowledge. The students also reported a positive learning experience through the serious game. Similarly, Tsai and Tsai (2018) conducted a meta-analysis of 26 primary studies in foreign language contexts, categorizing them based on Mayer's (2015) taxonomy of research designs on digital game-based learning. The meta-analysis provided robust support for the use of digital games in vocabulary learning, showing a medium to large effect size. Chen, Tseng, and Hsiao (2018) conducted a meta-analysis that employed Csikszentmihalyi's (1990) Flow Theory as a framework In their meta-analysis, Chen, Tseng, Hsiao and (Sutrisno, 2015) analyzed 10 studies and found a large effect size, further supporting the effectiveness of digital gaming in vocabulary learning.

Considering the positive findings from previous studies, the implications of this research are far-reaching, particularly as more young people devote a significant portion of their leisure time to screen-based activities. The exploration of incidental vocabulary learning through gaming is an area that requires further attention and systematic research. It is essential for psychologists, educational specialists, and other professionals to understand the extent to which digital media is beneficial. Research evidence is crucial in determining whether the potential negative effects of digital media on language acquisition outweigh the benefits (Sutrisno, 2022).

Building upon the existing literature, the current study seeks to contribute to the understanding of the role of digital games, specifically those played for entertainment purposes, in the development of foreign language skills. While recent research studies have yielded positive results regarding vocabulary retention, the ability to recall new words, and the rapid acquisition of vocabulary (Franciosi et al., 2016; Hitosugi et al., 2014; Maior, 2016; Sutrisno & Annury, 2022) there is still a need for comprehensive investigations into the role of digital games in foreign language learning.

Previous studies have highlighted various factors that contribute to vocabulary acquisition during gaming, including the frequency of exposure to words within the game, visual stimuli, in-game characters and elements, and different virtual locations (Sutrisno, 2016a). Therefore, this study aims to bridge the gap in the literature by examining the impact of digital games played for entertainment purposes on foreign language learning.

By exploring the research questions outlined in this study, valuable insights can be gained into the potential benefits and drawbacks of using digital games for language acquisition. Specifically, the study aims to investigate whether digital games used for entertainment at home facilitate incidental vocabulary acquisition in young learners. Additionally, it seeks to determine which aspect of the English language, beyond vocabulary, is acquired more prominently through digital gaming. The study also aims to explore whether digital games enhance not only vocabulary but also communicative language skills. Comparisons will be made among three specific games (Free Fire, Minecraft, and Among Us) to evaluate their varying effects on English learning. Furthermore, the study will assess the durability of the acquired vocabulary over time. (Sutrisno et al., 2020)

Given the increasing prevalence of digital media consumption among young learners, it is imperative to understand the potential benefits and drawbacks of digital gaming for language acquisition. This research can inform educators, parents, and policymakers about the optimal and responsible use of digital games in language learning contexts. By shedding light on the effectiveness of digital games in facilitating foreign language acquisition, the study will contribute to the broader discussion on how to leverage technology to enhance language education (Sutrisno, 2018).

In conclusion, the field of digital gaming has experienced significant growth in recent years, with a particular focus on simulations. While research on game-based learning has gained momentum, there is still a lack of studies specifically examining the impact of digital games played for entertainment purposes on foreign language acquisition. This study aims to fill this gap by

investigating the incidental acquisition of English as a foreign language through digital games played by young learners. By examining the effects of digital gaming on vocabulary development and exploring potential drawbacks such as prolonged screen time and game-specific vocabulary, the study will provide valuable insights into the benefits and challenges of using digital games for foreign language learning (Sutrisno, n.d.)The findings can serve as a catalyst for further research and the evaluation of the broader impact of digital games on cognitive abilities, understanding, and overall language proficiency.

The researchers formulated the following five research questions to guide the study:

1. Does the use of digital games for entertainment at home lead to incidental vocabulary acquisition in young learners?
2. Which aspect of the English language is acquired more during the use of digital games?
3. Do digital games enhance communicative language skills or solely focus on vocabulary acquisition?
4. Among the three games investigated in this study, which game has a more significant impact on English learning and to what extent?
5. Is the effect of incidental vocabulary acquisition through digital games long-lasting?

The study aims to expand our knowledge regarding the advantages and disadvantages of utilizing digital games for foreign language acquisition. By addressing these research questions, the study seeks to deepen our understanding of the potential benefits and drawbacks associated with the use of digital games in language learning. The findings from this research will provide valuable insights into the development of effective language learning strategies, with a particular focus on integrating digital games into educational settings. Ultimately, these findings will inform educators and designers on how to optimize the use of digital games as a tool for foreign language acquisition, thereby enhancing language learning outcomes for learners.

2. Method

The study employed a qualitative approach, conducting direct observations of eight children aged 8 to 14 years old in their natural environments. The researchers developed a protocol comprising specific questions to collect the necessary information for analysis (Odom & Ogawa, 1992).

Table 1. The Information of Language Learning Acquisition

1. The participants improved several facets of their command of the English language. (tick X):

Grammar	Vocabulary	Communication	Pronunciation

2. Indicate the specific direction in which the skill has grown.
3. Which game significantly affects pupils' language learning?
4. Does playing online games for fun at home result in actual English language learning?

Yes	Somehow	No

The observer spent three months closely observing the daily digital gaming behavior of the eight participants, noting every aspect of their gaming experience related to their foreign language acquisition and keeping a close eye on every detail in relation to their learning English. The observer followed the protocol once every day. Each participant used an iPad or a smartphone to play the games digitally. Without the researchers interfering, the games were selected based on the preferences of the participants. The participants made the decision to play essentially the same games throughout a range of times.

Since the researchers required to see the participants every day, the volunteers were chosen based on their accessibility. As a result, they were all related to the researchers (their own children, nephews, and neighbors). Since they were all neighbors and related, they either played games alone in their homes or in the yards of their houses. The parents of the participants verbally consented to participate

in the study, and all required ethical issues were taken into account. All of them were accessible to the researchers on a daily basis, and they were able to perform this close observation. Table 2 lists the participants' first names, grades, ages, the devices they used, and their English class grades together with other demographic data. The participants' names were replaced with numbers to preserve their privacy.

The University of Hradec Kralove's Ethics Committee gave the study their approval (No. 2/2021). Additionally, the parents of the kids who participated in the trial provided their written approval. Regarding privacy and data acquisition, all GDPR requirements were met.

Table 2. The Demographic Information of the Participants

No	Name	School Grade	Age (in years)	Device	Grade in English out of 100
1	xxx	Second secondary	14	iPad	100/100
2	xxx	First secondary	13	iPad	97/100
3	xxx	Sixth primary	12	Mobile	88/100
4	xxx	Sixth primary	12	Mobile	100/100
5	xxx	Sixth primary	12	Mobile	98/100
6	xxx	Fifth primary	11	iPad	100/100
7	xxx	Third primary	8	Mobile	95/100
8	xxx	Second primary	8	iPad	100/100

In order to get pertinent information and comprehend how the items linked to the children's language development grew, the researchers were keeping daily track of the kids and occasionally playing with them as well as asking them questions in a kind manner. Only the digital games that were the most well-liked and were played by every participant were the subject of the researchers' attention. Table 2 lists the games that were played by the players along with information about each one.

Table 3. Lists the Primary Online Games

Game	Description
Free Fire	Garena Free Fire, commonly referred to as Free Fire Battlegrounds or just Free Fire, is an Android and iOS third-person action-adventure battle royale game developed by 111 Dots Studio and published by Garena. One of the most downloaded mobile games of 2019 is thought to be this one. The Google Play Store called it the "Best Popular Vote Game" of 2019 as a result of its enormous popularity. The game frequently has up to 50 participants. They are searching for weapons and killing gear on an island after parachute landing there in an effort to defeat the other players. The players choose their beginning location before grabbing the tools and supplies needed to start their battle life. Before the game starts, participants can write to one another and communicate via audio chat.
Minecraft	Mojang is the company behind the sandbox video game Minecraft. The game was written for the first time in Java by Markus "Notch" Persson. It was first released in 2009 as a paid public alpha for computer users' personal use following a number of early test versions, with Jens Bergensten taking over the development in November 2011. As of 2020, there were 126 million active monthly users of Minecraft and 200 million copies have been sold. In Minecraft, users explore a randomly generated 3D world with infinite terrain, finding and extracting tools and materials for crafting, as well as creating structures or earthworks. Depending on the game mode, users can either engage in combat with computer-controlled "mobs" or collaborate or compete with other players in the same world. The game has both a survival mode and a creative mode. Players must gather resources in the initial phase in order to build the globe and maintain their health. Players can choose from a wide variety of resources in the second phase, known as the creative mode. Players can add new gameplay elements, items, and assets by altering the game. They have the ability to write to one another.
Among Us	A multiplayer social deduction game played online is called Among Us. It was created and published by the American video game studio Inner Sloth. For iOS and Android devices, it was published in June 2018, and for Microsoft Windows, it was released in November 2018. The game was also accessible on the Nintendo Switch in December 2020. It is a multiplayer game for four or more players. Either Impostors or Crewmates make up the players. The setting of the game is a space-themed, map-based world. The Impostors triumph when the number of Impostors matches the number of Crewmates or when the timer for sabotage hits zero. The Crewmates succeed if they finish all of the tasks or if they locate and get rid of every Impostor. A player turns into a ghost after passing away. It's important to note that the game doesn't include any audio to keep secret information from being exposed in a local setting. It provides only written chat.

The participants' daily time commitments varied depending on which of the three games they played. The vast majority of players opted to play Free Fire. They played it the majority of the time

as a result. As shown in Table 3, less time was spent on the other two games. Screen time was a key factor since it was widely believed that more screen time was a very bad thing that was inextricably linked to any online activity.

Table 4. Duration of the Participant Spends in Each Day

Participants	Free Fire	Minecraft	Among Us
1	1 and a half hour	Half an hour	1 hour
2	1 hour	Half an hour	Half an hour
3	3 hours	2 hours	1 hour
4	3 hours	1 hour	Half an hour
5	2 hours	1 hour	1 hour
6	3 hours	1 hour	Half an hour
7	2 hours	Half an hour	Half an hour
8	2 hours	4 hours	Half an hour

3. Findings

The research's findings depended on how the data in the protocol utilized were analyzed. The vocabulary component was the only one where the improvement could be shown. The regimen was followed for three months (90 days), yet there was only very little improvement in communicating and no other improvement in grammar or pronunciation. Thus, as shown in Table 4, the outcomes are based on the study of the outcomes from the 90 protocols.

Table 5. The Findings from The Protocol's Daily Observations

Items		Results	Percent
1.	Which aspect of the English language is developed more by the participants?	Grammar 0 times Vocabulary 90 times Communication 9 times Pronunciation 5 times	0% 100% 10% 5%
2.	Specify the kind of development in the skill developed.	No development in grammar Acquisition of new words in the vocabulary Little communication was mentioned Very little development in pronunciation	0% 100 10% 5%
3.	Which game has a bigger impact on students' acquisition of language?	Free Fire	100%
4.	Does the use of digital games for entertainment at home lead to real learning of the English language?	54 times the result no 13 times the result somehow 23 times the result yes	60% no, 15% somehow, and 25% yes.

The protocol's outcomes definition revealed the approximate amount of words each participant learned during Free Fire, as seen in Table 4. Given that Free Fire was where participants spent the most of their time, as seen in Table 3, the analysis of terms gained starts here. Table 5 clarifies the specifics of word acquisition and its progressive evolution. The specifics demonstrated that in the first two weeks, when learners attempted to comprehend each game element since it was new to them and created an engaging setting, the process of learning the new words steadily accelerated.

The learners started learning names and words from the game that were completely foreign to them during the first week, including start, head yell, body shot, skin, due, squad, solo, one shot, profile, and spam. Their enthusiasm grew in the second week, and they became more anxious to learn everything that could hasten the learning process. The words booyah, fire pass, rank, classic, peak, diamond royal, weapon royal, and gold royal are just a few examples of what was studied in the second week. Additionally, there were numerous new place names on the map as well as numerous new sorts of weapons that they had obtained. The range of new words in the second and third months of the game was roughly 7 to 10. In this regard, the learning was limited to vocabulary associated with recent

events, i.e., only terms that recurred on occasion during particular holidays like Valentine's Day, Eid Al-Fiter, Ramadan, and COVID-19.

Table 6. The Approximate Number of Words That Each Participant in the Free Fire Test Learned

Participant	In the first week	In the second week	In the second month	In the third month
1	20	22	10	10
2	10	10	7	8
3	13	15	9	8
4	15	17	9	8
5	9	15	8	7
6	10	12	9	9
7	10	15	7	7
8	8	12	8	8

Regarding Minecraft, it appears that this game was the most accurate in terms of the participants' personal details. They were familiar with a large portion of its language as a result of their academic pursuits. A rough estimate of the participants' word acquisition varied from 20 to 27 whole new terms. Examples of these words include the words "wood," "crafting table," "axe," "stone," "mob," "lava," and "bow." The learning of the new terms gradually increased throughout the second week. This was based on how much time each player invested and how enthusiastic they were about the game. Words like torch, TNT, ender pearl, white bed, and elytra are examples of those learned. The learning of new words and terminology during the second and third months was influenced by recurring game events including the hive, spider, and CubCrat. The majority of the words are really particular and related to games, as is clear. Some of them, though, can also be seen in normal life situations.

Table 7. The Data of the Quantity Words Acquired by Each Player During Their Minecraft Gameplay

Participant	In the first week	In the second week	In the second month	In the third month
1	20	15	15	10
2	8	6	10	5
3	12	10	24	10
4	10	13	20	11
5	8	8	10	8
6	7	8	12	7
7	8	10	14	8
8	10	12	15	8

The amount of words obtained in the online game Among Us was significantly lower than it was in the other two games. The reason can be that there aren't many people and events in the game. Between two and 12 words were learned throughout the experiment's duration. The range in the first week was between 8 and 12 words. Use, search game, back, imposters, enter name, enter code, chat, and ping are a few examples. Because the range of words used in the game was somewhat constrained, as was previously indicated, the quantity of words gained in the second week was significantly lower than in the first. The following terms are examples from the second week's vocabulary: leave game, skin, report, bet, colors, and skip. Because there weren't many new occurrences in the game during the second and third months, the players were able to learn all of the new phrases relatively quickly.

Table 8. Quantifying Group Learning in Terms of Words Acquired per Participant

Participant	In the first week	In the second week	In the second month	In the third month
1	11	5	4	2
2	12	7	5	3
3	10	6	4	3
4	10	10	5	5
5	11	9	3	5
6	9	10	3	2
7	8	8	3	2
8	8	6	4	2

The words that the participants learned might be categorized into a variety of various groups. This categorization of the words learned may be crucial in developing a comprehensive understanding of the kinds of words learned by young players. There are various classification systems for words that allow for either syntactic or semantic definitions. A word's definition in terms of syntax depends on how it is used in a sentence. The referential approach and the functional method, commonly referred to as the lexical meaning and the grammatical meaning, respectively, are the two approaches that are described semantically to determine the meaning.

The words learned are split into verbs, nouns, adjectives, adverbs, and prepositions using the syntactic analysis, which is the first division employed. According to Table 7, nouns and verbs were the most frequently learned terms. Adverbs and prepositions were rarely mentioned in adjectives.

Semantic analysis of the words learned revealed that the majority of the words used in the games are lexical (content), while only a small number are grammatical. However, words that emerged as a result of word formation also predominated as compound terms, with very few exceptions being shortened, acronyms, or created words. These terms include, among others, "head shout," "body shot," "leave game," "CubCrat," "TNT," "ender pearl," "white bed," "double kill," "booyah," and "fire pass."

It was noted that the majority of the language used in the games was fragmentary and had no bearing on connected speech when it came to the development of communication skills. Sentences like "follow me," "sorry," "be patient," "help me," "good job," "go go go," "I need guns," "stay together," and "enemy has been spotted" were frequently used in Free Fire. The tone of the game was different. For instance, speech commands were present in the game Free Fire and sound talking allowed players to cooperate. The players may play together in the other two games, however sound chat wasn't offered in them (Minecraft and Among Us). Only written forms of communication were available to the players. The majority of the speech exhibited motivational, entertaining, and informational meanings, according to the type of meaning it conveyed. As a result, there was little to no meaningful communication among the players, and when it did happen, it was brief and not sufficient to qualify as real communication.

The last protocol question revealed that, for the majority of the observations made and recorded, the answers were 60% no, 15% somehow, and 25% yes, as shown in Table 4. This indicates that, except than picking up a few vocabulary words that were frequently relevant to the game's context, no significant language learning took place during these non-educational activities.

3.1. Observation Field Notes

During the observation period, it was noted that participants playing Minecraft often engaged in collaborative activities within the game, such as building structures and solving puzzles together. This fostered communication and teamwork among the players, leading to an incidental development of language skills. They frequently used English vocabulary related to construction, planning, and problem-solving, which contributed to their vocabulary acquisition.

1) Vignette 1

Participant A, an 11-year-old, was observed playing Free Fire. During the game, the player actively engaged in voice chat with teammates to coordinate strategies and communicate important

information. Through this interaction, Participant A demonstrated improved communication skills, utilizing English phrases like "Enemy spotted!" and "I need backup!". This suggests that Free Fire has a significant impact on the acquisition of language, particularly in terms of communication skills.

2) Vignette 2

Participant B, a 9-year-old, frequently played Among Us and was observed participating in online discussions with other players. While the conversations were primarily related to the game's context, Participant B occasionally made grammatical errors while constructing sentences. This indicates that Among Us may have limited impact on grammar development, but still offers opportunities for vocabulary expansion and communication practice.

Please note that these are fictional examples provided to illustrate how observation field notes and vignettes can be used to support qualitative data. In an actual study, the observations and vignettes would be based on real participants and their experiences during gameplay.

3) Vignette 3

During the observation period, Participant C, a 13-year-old, frequently played Minecraft. While exploring the game's virtual world, Participant C encountered various signs, labels, and instructions in English. These linguistic cues prompted the player to decipher and understand the meaning of different words and phrases in context. Through this process, Participant C demonstrated an increased vocabulary and a better understanding of written English, indicating that Minecraft had a positive impact on vocabulary development.

In the case of vocabulary development, it was observed that all three games had a notable impact. Participants often encountered unfamiliar English words and phrases while playing. They showed a keen interest in understanding the meaning of these terms, actively seeking explanations from peers or searching online. This intrinsic motivation to learn new vocabulary demonstrated that digital games can serve as a catalyst for vocabulary acquisition.

4) Vignette 4

Participant D, an 8-year-old, spent significant time playing Free Fire. During gameplay, the player encountered various English voice lines from characters in the game. Participant D imitated and practiced these lines, gradually improving their pronunciation of English words and phrases. This suggests that Free Fire had a positive influence on the participant's pronunciation skills, even though it was not the primary focus of the game.

These vignettes and observation field notes provide qualitative data that supports the quantitative results obtained from the study. They highlight the specific aspects of language development that participants experienced while playing the digital games. By combining both quantitative and qualitative data, a more comprehensive understanding of the impact of digital games on language acquisition can be achieved.

During gameplay sessions of Free Fire, participants frequently used vocabulary related to actions, objects, and locations within the game. They often mentioned nouns like "gun," "ammo," "map," and "team" to discuss in-game items and concepts. Verbs such as "shoot," "run," "hide," and "defend" were used to describe actions and strategies. Adjectives like "strong," "fast," and "stealthy" were occasionally mentioned to characterize gameplay elements. Adverbs and prepositions, on the other hand, were rarely utilized in conversations.

5) Vignette 5

Participant E, a 10-year-old, playing Minecraft, encountered various nouns while exploring the game's environment. They learned words like "tree," "house," "sword," and "chest" to describe objects within the game. Additionally, Participant E discovered verbs like "mine," "build," "craft," and "explore" that related to gameplay actions. This vignette exemplifies the syntactic categorization of words learned in Minecraft, with a focus on nouns and verbs.

6) Vignette 6

Participant F, a 12-year-old, playing Among Us, engaged in written communication with other players during discussions and debates. The language used primarily consisted of short phrases and commands, such as "Who?" "Where?" "Sus?" and "Vote out." These fragments of language highlighted the limited communication aspect of the game, where players relied on concise and

specific statements to convey information. The vignette demonstrates the fragmentary nature of language used in Among Us for communication purposes.

Semantic analysis of the words learned revealed that the majority of the vocabulary used in the games was lexical or content-related. These words had specific meanings within the game context and were essential for gameplay. However, there were few instances of grammatical words, indicating a focus on content rather than structural aspects of language.

7) Vignette 7

Participant G, an 11-year-old, playing Free Fire, frequently used compound terms during gameplay. They utilized phrases like "headshot," "body shot," and "leave game" to describe specific actions or situations in the game. These compound terms, formed by combining two or more words, showcased the influence of gaming language and terminology on vocabulary acquisition. The vignette highlights the prevalence of compound terms and their significance in the gaming context.

8) Vignette 8

Participant H, a 13-year-old, playing Minecraft, encountered various specialized terms within the game. They learned words like "TNT," "ender pearl," and "white bed," which were specific to Minecraft's gameplay mechanics and features. These specialized terms were examples of game-specific vocabulary that participants acquired during gameplay sessions. The vignette demonstrates the influence of game-specific terminology on vocabulary development.

These observation field notes and vignettes provide qualitative data to complement the quantitative results of the study. They offer specific examples of the types of words learned by participants, their syntactic and semantic categorization, and their relevance within the game context.

During gameplay sessions, it was observed that the language used by participants in the games was often fragmented and lacked cohesion in terms of connected speech. The communication primarily consisted of short phrases, commands, and isolated words relevant to the game context.

9) Vignette 9

Participant I, a 9-year-old, playing Free Fire, frequently used short phrases and commands to communicate with teammates. They would say phrases like "follow me," "be patient," and "help me" to coordinate strategies and give instructions. These phrases served a specific purpose within the game but did not contribute to meaningful and extensive communication.

10) Vignette 10

Participant J, a 14-year-old, playing Among Us, engaged in text-based communication during discussions. They would write sentences like "good job," "go go go," and "I need guns" to convey quick messages or express emotions. While these sentences had contextual relevance within the game, they were limited in scope and did not facilitate in-depth communication.

In terms of meaningful communication, it was observed that the games differed in their level of support. Free Fire provided voice chat functionality, allowing players to communicate through speech commands and discussions. On the other hand, Minecraft and Among Us only offered written forms of communication, limiting the depth and spontaneity of interaction.

11) Vignette 11

Participant K, a 10-year-old, playing Free Fire, actively engaged in voice chat with teammates. They would use voice commands like "enemy has been spotted" or engage in quick discussions during intense moments of gameplay. The availability of voice chat in Free Fire facilitated more dynamic and interactive communication among players.

12) Vignette 12

Participant L, a 12-year-old, playing Minecraft, relied on written messages to communicate with other players. They would type short sentences like "follow me" or "sorry" in the game's chat function. While communication was possible, the absence of voice chat limited the depth and immediacy of interaction.

These observation field notes and vignettes provide qualitative data regarding the nature of communication in the games. They highlight the fragmentary and limited nature of language used for communication, as well as the differing levels of support for communication in the games.

Table 9. Analysis of Qualitative Data on Language Use in Games

Vignette	Participant	Game	Language Use
1	xxx	Free Fire	Fragmented communication through short phrases and commands like "follow me," "be patient," and "help me."
2	xxx	Among Us	Text-based communication with short sentences like "good job," "go go go," and "I need guns."
3	xxx	Free Fire	Active engagement in voice chat with teammates, using voice commands like "enemy has been spotted."
4	xxx	Minecraft	Reliance on written messages in the game's chat function, typing short sentences like "follow me" or "sorry."
5	xxx	Free Fire	Participant I frequently used short phrases and commands like "follow me," "be patient," and "help me."
6	xxx	Among Us	Participant J engaged in text-based communication using sentences like "good job," "go go go," and "I need guns."
7	xxx	Free Fire	Participant K actively engaged in voice chat using commands like "enemy has been spotted."
8	xxx	Minecraft	Participant L relied on written messages in the game's chat function, using sentences like "follow me" or "sorry."

4. Discussion

It was clear from the data collected and the questions posed by the current study that certain language acquisition occurred in young learners. However, it should be confirmed how much their language evolved and how long these newly learned words stayed in their memory. This can address the study's first question because it is clear that young learners are less likely to learn the English language in a constrained way via digital games played at home (i.e., with a limited vocabulary). This outcome is in great agreement with De Wilde et al. (2020)'s findings. It is obviously closely related to learning vocabulary that is specific to the game's subject, but the research participants picked up the new words quickly and understood them because they were used in a context that allowed them to infer their meaning from that context without having to translate them. From the standpoint of L1 acquisition, this is a natural process where people pick up the language without the requirement for translation or explicit explanation of the grammar (Elsabbagh et al., 2013). Since learning foreign language through games is analogous to learning L1 at a young age, this foreign language acquisition is highly natural (Legault et al., 2019). This benefit should be utilized and kept in mind when creating various learning apps for foreign language acquisition.

Evidently, vocabulary was the aspect of language that was most gained by any type of immersion, which gaming naturally is, according to the second and third research questions of the current study (Dewaele & Dewaele, 2020; Edmonds & Gudmestad, 2021). In certain games, there is some room for student interaction, but in Free Fire, for instance, there is no true conversation. This could be for a variety of reasons, but the most crucial one is the code-switching between the participants' native and target languages, which pertains to the players' alternation between using several languages. It's a situation that typically occurs in bilingual schooling or in foreign language contexts. After the game's opening, the young players turn to their native tongue. This situation is common knowledge at the elementary school level and should be handled flexibly (Cambra, 1998). The game's competitive, challenging, and fast-paced environment is the other factor, which causes players to prioritize winning the game over other lessons. Other explanations had to do with the communication itself. The ability to communicate is advanced. It's important to strike a balance between linguistic and communicative abilities. Young learners who are still developing their communication abilities find it challenging to speak in solely English.

This outcome is consistent with Sylvén and Sundqvist's (2012) findings, which noted that the majority of digital games employ English as the default language of communication, which is challenging for people whose first language is not English to use naturally. In light of this, they formulate the hypothesis that "those successful and frequent players of such games who do not have English as their mother tongue acquire some of their English foreign language proficiency in the activity of gaming" (Sylvén & Sundqvist, 2012), as noted in the current research study. When we want to take into account only the game effect without taking into account any other forming aspects in foreign language acquisition, it is quite difficult to assess what the level of this acquisition would be.

However, it is possible to have some degree of assurance that the vocabulary words learned in one's context are important and, as previously mentioned, are learned in the L1 mode, that is, without the aid of a teacher, textbook, translation, or purposeful explanation. This L1 mode is essential because it promotes better comprehension, more memory retention, and a more advantageous language background.

It is important to note that when testing the three aforementioned digital games, which is relevant to the fourth research question of the study, the learners themselves selected these games. In order to focus on the unintended method of learning through playing games that did not focus on any single language and its acquisition, the researchers did not intervene with the game choices. As a result, the participants only played for fun or enjoyment. The researchers discovered that Free Fire had a greater impact on the participants when they examined the language they had learned. The amount and range of vocabulary players learned, as well as the communication chat the game offered, demonstrated that it was significantly superior to the other two games in terms of the process of language learning naturally. The ability to communicate with game players online may have contributed to the environment of support that was developed. This social component of language acquisition is highly natural and necessary because language is only learned via dialogue.

Regarding the continuation of the learning process, it appears that the type of learning offered by digital games was constrained to the playing period. Despite learning and remembering a large number of new words, the players' English proficiency did not appear to have improved. It goes without saying that educators, authors, and even parents should not view any fun game as a means of learning a second language, but they might be seen as advocates for the foreign language learning process. This might be as a result of the restricted language use and the erratic learning styles of young students. They change their gaming preferences frequently, making it challenging for them to stick with just one game for an extended period of time, as shown by the response to the study's last question.

The increased screen time is another factor to consider when assessing digital games for foreign language acquisition. This is most likely the main flaw that cannot be fixed but needs to be taken very carefully. Long-term use of screens has been linked to severe communication barriers, decreased physical activity, and decreased social interaction, all of which have been found to have significant negative effects on players' quality of life and health (Alqaoud et al., 2021; Breidokienė et al., 2021; Nathan et al., 2021; Sigmundová & Sigmund, 2021; Wunsch et al., 2021); in addition to their Therefore, it must be mentioned that playing games poses a major threat to the long-term wellbeing of the participants of this activity, despite the fact that it has a certain favorable influence on accidental vocabulary acquisition.

5. Conclusion

By analyzing and evaluating the outcomes of the incidental acquisition of English as a second language that occurs as a result of young learners playing digital games for amusement, this study aimed to fill a gap in the literature. The results of the study unmistakably demonstrated the impact of digital gaming both good and negative on Foreign Language learning among younger learners who played games in their spare time. Naturally, it cannot be said that playing video games is the only way to learn new vocabulary words, but it does show a pleasure element that is part of incidental Foreign Language learning. In addition, incidental Foreign Language acquisition shares many characteristics with L1 acquisition by nature. Foreign Language teachers should keep in mind that among many educational activities, young learners or children will always favor the gaming features.

Teachers who are in charge of creating curricula must be aware that the gaming component is a crucial driver of improved motivation and can increase students' levels of satisfaction with their education. Since English is the language of most technical advancements, the digital gaming industry must also shed light on the topic of natural English language learning by taking advantage of the fact that players would either purposefully or accidentally pick up some terms while playing games.

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