Level up your Pronunciation: Impact of a Mobile Game[1]

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Abstract

This paper investigates the effectiveness of students playing the *Spaceteam ESL* video game to enhance their pronunciation of English words and sentences. To achieve this goal, the researcher conducted a quasi-experimental pretest-posttest research design. The formation of the experimental group and control group employed the practice of convenience sampling. The experimental group experienced playing the selected mobile game during a weekly EFL class while the control group did not implement any mobile game during class time. Instead, the other students engaged in analog pronunciation games that paralleled the mobile games in terms of opportunities for language and pronunciation, but just in a different medium. The student participants in both the control and experimental groups were given a pretest before the treatment and a posttest after the treatment. These tests, along with qualitative measures, namely an interview and a questionnaire, revealed relevant results. The data illustrated that the experimental group showed significant improvements in their pronunciation skill. Thus, the students' participating in the digital experimental group significantly benefitted from playing the mobile game, Thus, mobile gameplay can be considered an effective instructional tool, which can be used as an alternative resource in the EFL class where pronunciation is being taught as a learning objective.

Resumen

Este artículo investiga la efectividad del videojuego Spaceteam ESL para mejorar la pronunciación de palabras y oraciones en inglés. Para lograr este objetivo, se realizó una investigación cuasi-experimental pre-post prueba. Los grupos experimental y de control se formaron usando muestreo por conveniencia. El grupo experimental practicó el juego móvil seleccionado durante una clase semanal de inglés como lengua extranjera, mientras que el grupo de control participó en juegos de pronunciación analógicos paralelos a los juegos móviles en términos de oportunidades para el lenguaje y la pronunciación, pero en un medio diferente. Los estudiantes participantes en los grupos de control y experimental recibieron una prueba previa antes del tratamiento y una prueba posterior después del tratamiento. Estas pruebas, junto con medidas cualitativas, a saber, una entrevista y un cuestionario, revelaron que el grupo experimental mostró mejoras en su habilidad de pronunciación, pero esta mejora no fue significativa. A pesar de ello, se considera que los participantes sí se beneficiaron porque mejoraron sus habilidades de pronunciación. Por lo tanto, el juego móvil puede considerarse una herramienta de instrucción eficaz, que puede usarse como un recurso alternativo en la clase de inglés como lengua extranjera, donde la pronunciación se enseña como un objetivo de aprendizaje.

Introduction

Learning English as a foreign language (EFL) is a demanding endeavor for students to engage in. However, it also involves many challenges for students. One of these challenges is pronunciation. The pronunciation of words might be a barrier for students to adequately communicate. Pronunciation may pose several difficulties for many students. Therefore, this challenge can never be overstated. The importance of pronunciation can equally not be overstated since pronunciation is one of the cornerstones of oral communication. Without adequate pronunciation, oral communication can be severely impaired. Even the concept of adequacy depends on the context in which the speaker finds himself. In certain contexts , such as speaking at a conference, the audience expects the pronunciation of the speakers to be more than adequate, in other words, excellent and outstanding.

Language is frequently expressed and conceived as a system. This system can be thought of as being composed of various different subsystems. Of interest here are two subsystems: a sound system and a meaning system. The sound system is a system of units of speech that the speaker needs to pronounce accurately and clearly. Generally, these units of speech can be called words or vocabulary. The speaker must use these words correctly in the way they are spoken and the patterns they follow. This latter is called grammar – the way the words are to be used in combination to express meaning. It is important for students to be able to understand and master both systems while they work together. For students to successfully communicate, they must use these systems together. Students must pronounce the words correctly and accurately as well as use the correctly pronounced words in an accurate way – that is, use correct grammar. Thus, the three systems or components of a language system—grammar, vocabulary, and pronunciation—need to be considered. These components need to be learned (Reed & Levis, 2019). Any language program that aims to address the needs of language students should consider teaching these components of language. As with all components of language learning and instruction, none should be neglected or put at a lower priority than others, as the development of various skills leads to proficiency. Pronunciation, vocabulary and grammar are often the language features that are considered the most relevant, because

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they reflect the natural balance of language acquisition itself (Tudor, 2001). This means that language needs to be conceived as a natural balance or symmetry. For language to exist, it is necessary to integrate these three components since their essential balance is divided ~~equally~~ between pronunciation, grammar, and vocabulary.

The second reason is focused on effective communication. The aim of many language programs is communicative competency because the fundamental purpose of language learning is assumed to be ultimately real and effective communication. It has been deemed that to help students learn how to communicate, they need to learn communicative language skills (Brown, 2015) and language programs should address all three of these components of language during the acquisition process. This is true, regardless of the proficiency level of students, as beginning, intermediate, and advanced language level learners need all these language components to develop appropriately. Despite this need for a balanced approach, the components of pronunciation instruction are sometimes overlooked in language programs, while the components of vocabulary and grammar are frequently addressed across all levels. Thus, a third reason for including pronunciation in language teaching is that it helps students gain confidence in communicating and speaking.

Many students who speak in a foreign language may experience anxiety because they fear that their pronunciation is inadequate (Nakazawa, 2012). However, it is important that language learning environments remain stress and anxiety free so the students' anxiety is lowered as much as possible (Krashen, 1982). To emphasize the importance of lowering students' anxiety in a learning environment, it is suggested that no actual learning takes place in a learning environment with anxiety because the students' "affective filter" would inhibit learning (Krashen 1982). Thus, to help lower students' anxiety towards speaking and communicating in English, a pronunciation component needs to be included. Such a component would provide students with confidence when speaking, as well as develop proficiency, and lower their anxiety. Another reason for the importance of pronunciation teaching is that English has become one of the main languages for oral communication globally (Crystal, 1997), and acquiring comprehensive and appropriate pronunciation is even more important.

Thus, it is clear that a pronunciation component for a language course is essential. Another issue needs to be now addressed: How to teach or practice this pronunciation component in a language program. Once educators understand the importance of including such a component, they need to be able to design an effective way to teach it. However, the selection of a method or technique that helps students acquire accurate pronunciation can be difficult based on the educators' experience and professional support network. This article does not deal with or address the overarching issue of developing a model for teaching pronunciation. It focuses on the goal of intelligibility as an outcome for pronunciation instruction (Moedjito & Ito, 2008).

Literature Review

Oral and Pronunciation Development

Many students have found that developing their oral skills to be quite challenging. Not just oral fluency, but also pronunciation is an important aspect of language learning and effective communication (Derwing & Munro, 2005). Without well-developed pronunciation, communications would be extremely difficult, if not impossible (Dalton and Seidlhofer 1994). The importance of pronunciation development cannot be, thus, overstated. There are two main reasons for this: intelligibility and ensuring good pronunciation enters long-term memory (Nation & Newton, 2008). The benefit of good pronunciation entering into the memory of a second language learner is that memory will make the student develop a greater intuition of what constitutes good pronunciation. One important mechanism involved in working memory is called the phonological loop (Ellis & Beaton, 1993). This phonological loop is like the practice of a person repeating a phone number to remember it. It is a primary method for a student to move a word into his or her working memory. From there, the word can be moved to the long-term memory. However, the piece of information must have a stable pronunciation, or it will not correctly enter long-term memory (Ellis & Beaton, 1993). The size of this phonological loop and the students' working memory does depend on the students' knowledge of patterns of pronunciation. It is important for students to develop a stable pronunciation to help both their working memory and intuition develop what constitutes good pronunciation.

Mobile-assisted Language Learning and Gaming

It is a well-known fact that mobile phones have become widely popular throughout the world. In fact, all these devices that have given people greater access to information technology have benefited education

(McGrail, 2005). While desktop computers and other digital devices have ever increasing features, the mobile phone in many contexts may be more versatile and accessible in many classrooms. This means that mobile phones and other portable devices that involve information technology can be used to enhance language learning (Kessler & Hubbard, 2017). Mobile phones in particular have shown great promise in language learning (Stockwell, 2007). One benefit is that the use of mobile phones results in an improvement in student outcomes (Green, 2016). Another benefit is that mobile phones can transform a traditional classroom to a more effective learner-centered classroom (Drexler, 2010). Mobile phones have proved to motivate students to use the language they learned in the classroom outside the classroom (Egbert & Neville, 2015).

Mobile phones have also been popular for playing mobile games, and therefore, the implementation of gaming in the language classroom has also promised great benefits (Gee, 2007; Prensky, 2006). The popularity and growth of the use of video games in the educational context is such that a new field has developed: digital game-based learning (DGBL). DGBL looks at how digital games (usually video games) can be exploited for educational purposes. In a meta-analysis of DGBL studies, the benefit most mentioned addressed affective and motivational factors (Connolly et al., 2012). In other words, the main benefit of video games in the language classroom is that they effectively motivate students. Other benefits include developing oral proficiency (Lan, 2014) and writing skills (Allen et al., 2014). This study looks at one particular mobile game, *Spaceteam ESL*, and how it can assist students in learning English as second or foreign language. *Spaceteam ESL* has proved to help with developing students' oral fluency (Grimshaw & Cardoso, 2018), oral reading fluency (Cardoso et al, 2019), and engagement in classroom language learning (Cardoso et al., 2015). This study also considers how the use of this mobile game can influence student pronunciation development in the language learning classroom. Although a significant amount of research has been done on mobile game use for other language skills, there is not much research on how mobile games can affect the pronunciation skill of students. Thus, this study investigates the intersection of pronunciation practice and mobile game use in relation to *Spaceteam ESL*.

The article attempts to answer these research questions:

RQ1: *Is playing the mobile game Spaceteam ESL significantly effective in improving the students' pronunciation skills?*

RQ2: *What are students' perceptions of playing the mobile game Spaceteam ESL in the language classroom?*

Method

Participants

Ninety-eight South Korean EFL students (n=98) took part in this study. These participants were between the ages of 18 and 22. The mean age was 20. There was a total of 54 females and 44 males. These students were learning English as a foreign language in a university in South Korea. This was a vocational university, so the departments of all participants involved studying a trade or vocation. The students' areas of concentration were communication, construction, sports community, and civil engineering safety. All the language classes at this university are composed of students from the same department. Table 1 presents the students with their different departments.

Department	Male	Female	Total
Electronics	8	6	14
Construction	15	2	17
Communications	3	41	44
Civil Engineering Safety	10	2	12
Sports Community	8	3	11
Total	44	54	98

Table 1: Distribution of the participants by departments

Passing this EFL course is mandatory for students to graduate. The course lasts 15 weeks: Weeks 1, 8, and 15 were not available for this study because of the Orientation, Midterm Exam, and Final Exam. This leaves 12 weeks of instruction for this study. All classes follow the same curriculum and coursework, regardless of the department of the students. Language proficiency or level was not considered when the university formed these language classes. This is a common practice in universities in South Korea.

The participants for this study were recruited from seven classes where the researcher was the principal instructor. These were the seven intact classes used in this research study. Following the method of non-

random convenience sampling, the participants were selected from these seven intact classes. The participants were distributed into one of the two research groups: the experimental group or control group. The experimental group was composed of students from three of these intact classes. The control group was composed of students from four of these intact classes. The choice of which classes were to be used in the experimental group and which were to be used in the control group was entirely random. Table 2 presents details of the classes that composed the experimental group and the control group. Also, students in the researcher's classes participated in this study with full consent. Thus, the researcher and author of this study was also the instructor of these students. Students did not receive any compensation (i.e., monetary or academic credit) for their participation in this study. They participated in this study because they said it would benefit them in their English study and that this research would help others.

	CG	EG	Total
Construction	0	17	17
Communication	29	15	44
Sports Community	0	11	11
Electronics	14	0	14
Civil Engineering Safety	12	0	12
Total	55	43	98

Table 2: Distribution of students in research groups

Materials

Pronunciation Test

A set of assessments that included a pretest, posttest, and delayed posttest was developed. The purpose of these tests was to determine the skill level of pronunciation of students before and after the intervention described in this study. These tests were written using vocabulary and sentences that were to be taught in the class. The fundamental design of this set of pronunciation tests followed previous pronunciation test designs (Hole, 1983; Koren, 1995). The pronunciation test created by Koren was clear and unambiguous, therefore, it was selected. Following this pattern of testing, this test included a list of twenty carrier sentences. A carrier sentence is a sentence that carries or includes a target word that is actually being tested. The remaining words in the sentence carry this word and act as distractors, so students do not know which word is being tested. These words were among the words that the teacher would teach during the semester. The subsequent posttest evaluated the students' ability to pronounce the same 20 target words, which were randomly included in 20 different carrier sentences to ensure there was no test effect. That is, it was hoped this difference in sentences between the pretest and posttest would ensure the pretest would not influence the posttest. In addition, the delayed posttest followed the same procedure by targeting the same 20 words in 20 different sentences (also different from the pretest and posttest). The tests required that students read and record 20 sentences into their mobile phone. This recording was then uploaded to their account in the course's Learning Management System (LMS). The teacher accessed, downloaded, and analyzed these recordings later.

Video Game: *Spaceteam ESL*

The second instrument used in this study was the video game called *Spaceteam ESL*. This computer game is a simple computer game that pairs or trios play together in the same room on their mobile phones. The computer game requires students to communicate in order to progress in the game. This communication takes the form of students repeating instructions out loud to their partner who must act on these instructions. If the partner fails to act in time, then the whole ship starts to lose power and eventually crashes. Thus, the partners had to work together by saying the instructions accurately and listening to other instructions produced accurately enough to follow. This encourages players to pronounce the words accurately for the other player to comprehend and act on them. This mobile game was chosen because it possesses a unique gameplay and requires plenty of communication. The primary way to succeed in the game depends on the ability for players to verbally communicate in a clear and quick manner. An additional feature that adds an educational element to this otherwise entertainment-oriented mobile game is the customizable lexicon. The lexicon can be customized for each game assigned to students. The teacher can simply upload the specific vocabulary to the game that students use when playing the game.

Perceptions Questionnaire

The final instrument used in this study was the perceptions questionnaire. This perceptions questionnaire was composed of ten basic statements related to the perception of students of using DGBL in an EFL speaking

and listening class. Students rated those perceptions along a 6-point Likert scale (i.e., a 10 by 6 questionnaire matrix). This questionnaire was based on a previous questionnaire (Lai and Wen, 2012). This previous questionnaire inquired about the perceptions of playing a video game in the EFL speaking and listening classroom. This previous questionnaire had a Cronbach's Alpha reliability coefficient of .943. All the components of the questionnaire for this study were translated into the native language of the students, i.e., Korean. This was done with a qualified translator who was familiar with the fields of language education and DGBL. The English version of the questionnaire is included in the Appendix.

Experiment

The participants in this study were students who were already in seven intact classes. Students from three of these classes formed the Experimental Group (EG) while the other four classes formed the Control Group (CG). The choice of which classes were chosen to form part of the EG or CG was purely random. This choice was randomized by just randomly selecting which of the classes were to be designated as EG classes (and which were CG classes). The specific process was assigning numbers to the seven classes and using a computer app to generate random numbers. These random numbers dictated the designation of each of the seven intact classes. It was hoped that this type of randomization of classes would achieve a fair and equal distribution of students in both research groups. The classes from both groups experienced the same coursework and learning experiences in class with one exception: the intervention.

This intervention happened during the final 20 minutes of class. For the EG, this meant students were tasked with playing the aforementioned mobile game for 20 minutes near the end of class. Each week the customized lexicon was changed to reflect the words that were taught in class. These words reflected a theme that was taught in that week (e.g., health, hobbies, family). The words entered into the video game were related to this weekly theme. Each week, the class focused on the pronunciation of a different set of words. The CG participated in traditional classroom paper-based vocabulary-enriching activities for the same 20-minute period. These activities included pronunciation activities.

This study took place during a 15-week semester. After the Orientation in Week 1, a pretest was administered in Week 2. This pretest tested the students' ability to pronounce 20 challenging words. During most of the semester, a coursebook was employed to teach speaking and listening skills. This work included vocabulary work where pronunciation was emphasized. Then in Week 10, a posttest was conducted. This was followed by the perception questionnaire in week 11 and interviews in week 12. Only 43 students from the EG were given questionnaires because they were the only ones who had experienced playing *Spaceteam ESL*. Of these 43 participants, seven were chosen for interviews based on their responses on the perception's questionnaire. If it was thought that they could provide additional insight, they were chosen to be interviewed. After briefly looking at the questionnaire data, seven students were interviewed. A translator was present to ensure that the researcher's questions were clearly understood and that the participants' answers and other utterances were clearly understood. This was done during class time while other classmates were silently watching a class movie. Preliminary results were outlined and discussed with students in week 15. This was done very briefly because of the final exam that was being conducted in that class. This schedule is summarized in Table 3.

Week	CG activity Class Activity
1	Orientation
2	Pretest
3	Intervention
4	Intervention
5	Intervention
6	Intervention
7	Intervention
8	Intervention
9	Intervention
10	Posttest
11	Questionnaire
12	Interviews

Table 3: Semester Schedule

Data Collection and Analysis

All the data elicited throughout the 15-week course period were subsequently collected and analyzed. First, the data from the pretest and posttest were collected. That meant that test recordings from all the students

were collected and their pronunciation was scored. The recordings were scored according to Koren (1995)'s suggested method. This method outlined that a team of graders would rate each recording along a 6-point continuum: 1 (unintelligible), 2 (very poor), 3 (poor), 4 (reasonable), 5 (close to native), and 6 (native-like pronunciation). To do this, a panel of experienced EFL teachers was employed and each recording was rated by two instructors. This ensured inter-rater reliability. In fact, the inter-rater reliability was clearly acceptable with a good Intraclass Correlation Coefficient (ICC=. 882). This showed a degree of agreement between the raters given that the rating of these recordings was somewhat subjective. That is, the raters would listen and give a rating based on their judgment. In addition, the inter-rater reliability was equally high (IRR=0.875). This was the rating procedure that the raters followed to ensure all the samples were rated by two raters in a fair manner. For each test, there were 98 voice samples to rate, which corresponded to the 98 participants. These 98 samples were assigned a number (from 1-98). These numbers were randomized and assigned to different raters. Each rater received these 98 randomized samples, rated them, and entered this info into a Rating Record. Then, the numbers were randomized and assigned again to the second set of raters. This procedure was done for all three tests, i.e., the pretest, posttest, and delayed posttest. Thus, each sample was rated by two different raters. Next, the two ratings for each voice sample was averaged to generate a final test score for each voice sample. After that, these final test scores were compared, and statistical analysis was applied. The researcher wanted to determine how the students' pronunciation of the twenty target words had changed between the pretest, posttest, and delayed posttest. Lastly, the results from the questionnaire were also collected and analyzed, both using descriptive statistics and inferential statistics. Descriptive statistics include the mean (M) and standard deviation (SD). The data are assumed to follow a parametric pattern. This is because the data (1) follow a normal distribution, (2) are composed of interval data, and (3) the observations are considered independent. The last assumption is made because it is assumed that none of the three tests (i.e., pretest, posttest, delayed posttest) influenced one another in any significant way. This means that a parametric test could be employed. The paired t-test was employed. This test was chosen to determine if the performance of the participants in the EG had significantly improved after the intervention. That is, the results of the pretest and posttest (and, later, the delayed posttest) were compared to determine if there was a significant difference. This statistic was chosen to respond to research question one. Research question two was examined by using other tests. in the differences between the test gains of the CG and EG in the post-test. The purpose of conducting these tests was to determine if there was a significant difference between the test gains oup of participants to focus on the differences between the CG and EG . to determine if the treatment had made a significant difference in their performance.

Results

Improvement in students' pronunciation

Basic descriptive statistics were initially used when analyzing this data. This included calculating the mean and standard deviation of all the data sets. This analysis provided the results as can be seen in Table 4.

		Pre-Test		Post-Test	
Group	***n***	***M***	***SD***	***M***	***SD***
Experimental	43	3.30	1.08	5.12	0.88
Control	55	3.33	1.16	4.40	1.03

Table 4: Pronunciation changes (Descriptive statistics)

All the assumptions of parametric tests were met in this data. First, all the data were interval data. This was because all the quantitative data related to this part of the data analysis were test scores. Second, the data reflected an independence of observations. The test scores in the pretest were thought not to influence or bias the test scores of the posttest. Finally, the data was found to follow a normal distribution. The means and standard deviations were discovered to be suitable measures of central tendency. Several analyses were conducted, and they all concluded that the data conformed to a normal distribution. For example, the skewness and kurtosis levels of the data confirmed that it was normal. Also, the median and mean were almost identical in each data set. Other tests of normality confirmed this. Because the data conformed to a normal distribution, t-tests and other statistical techniques could be employed to respond to the first research question.

At first, a t-test was conducted on the pretest scores of the EG and CG. This was done to determine if the two groups were significantly equal before the intervention was conducted. The t-test revealed p=0.371. This shows that there is a significant similarity in test scores between the two groups. In other words, this reveals that the CG and EG both started with insignificant differences.

A within-group paired t-test analysis was next done to the EG pretest and posttest data. The paired t-test was applied to compare these two sets of data for significance. The resulting analysis showed a p-value of less than an alpha value of 0.05. This showed that there was a significant difference between the pretest and posttest scores among the EG participants. In addition to a t-test, the effect size of this data was measured. Glass' Delta was computed to be 2.5714. This indicates a large effect size. This indicates that this finding is quite strong. It is recommended to use the Glass' delta test for this EG's pretest and posttest data. This is because the standard deviations are significantly different even though the sample size is equal (n=43). When comparing the two samples, a F-statistic of 2.04 is generated where p=0.023 -- thus revealing standard deviations with significant differences.

Next, the same within-group paired t-test analysis was applied as in the previous paragraph but to the CG pretest and posttest data. This resulted in a p-value of less than 0.05 and a large effect size. The Glass's delta statistic was determined to be 1.0. The effect size was found to be large for the EG and CG within-group analysis (i.e., comparing the pretest and posttest scores). However, the effect size of the EG is about double the size of the CG effect size. This reveals that the findings of the impact of the intervention on the EG is greater than on the CG (which had no intervention).

The final t-test was conducted on the posttest scores of the EG and CG. The purpose of this t-test was to compare the pair of scores to determine if there existed any significance difference between them. A t-test was conducted and resulted in a p value less than the alpha of 0.05. This revealed that there was a significant difference between the post-test scores of the EG and CG. Furthermore, the gain scores need to be considered when comparing the final results between CG and EG. A gain score is the increased test score of the posttest over the pretest. It is calculated by subtracting the pretest score from the posttest. This gain score reflects, it is hoped, the increased learning of the participant who completed the pretest and posttest. The gain scores of both the CG and EG were computed. A t-test was conducted to compare these two sets of gain scores. The t-test generated a p-value of less than the alpha of 0.05. This clearly demonstrates that the intervention resulted in a significantly bigger gain in test scores for the EG over the CG. The effect size was calculated and Glass's Delta was found to be 0.88. This reveals a large effect size. This large effect size shows that these findings are quite strong and robust.

The results from comparing the EG's and CG's score gains indicated that the intervention of playing *Spaceteam ESL* during class time made a significant improvement in classroom performance. This result showed that the test results had not occurred by chance (that is, a chance less than 5%). Specifically, the p-value was determined to be less than 0.0001. This was below the level where the test results could have occurred by chance. Therefore, the answer to the first research question (i.e., "Is playing the mobile game *Spaceteam ESL* significantly effective in improving students' pronunciation skills?") is affirmative and significantly affirmative.

Students' Perceptions of Classroom Gameplay

The second research question asked, "What are the students' perceptions of playing the mobile game *Spaceteam ESL* in the language classroom?" This question was responded to by considering and analyzing the questionnaire administered to participants. The purpose of administering this questionnaire was to examine the students' perceptions of several issues related to playing video games in the classroom. The questionnaire was distributed to the 43 participants of the EG. The questionnaire contained 10 statements to be analyzed. First, Cronbach's Alpha was calculated to be 0.705 from the questionnaire responses, demonstrating that the questionnaire had sufficient internal consistency.

Second, descriptive statistics were employed to better uncover the findings from the questionnaire data. The questionnaire data were organized into a frequency table that shows the descriptive statistics for each of the ten statements (see Table 5). Two rows were allocated for each of the ten statements. In the first row (for each of the ten statements), the mean and standard deviation are first given. This is followed by the number of respondents who choose each of the six Likert scale categories for each of the 10 statements. The next row under these statistics shows the percentages for each of the six Likert scale categories.

The questionnaire data were organized into a frequency table that shows the frequency the participants chose one of the six Likert scale ratings for each of the ten questions (see Table 5).

	Mean	SD	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
Item 1 Helpful in learning new words	3.40	1.73	9 (20.9%)	5 (11.6%)	9 (20.9%)	6 (13.9%)	8 (18.60%)	6 (13.90%)
Item 2 Effective in improving oral skills	3.74	1.85	6 (13.95%)	9 (20.93%)	5 (11.63%)	4 (9.30%)	8 (18.60%)	11 (25.58%)
Item 3 Effective in improving aural skills	3.81	1.59	4 (9.30%)	6 (13.95%)	9 (20.93%)	6 (13.95%)	11 (25.58%)	7 (16.28%)
Item 4 Provides learning opportunities to improve oral skills	3.79	1.61	4 (9.30%)	7 (16.28%)	8 (18.60%)	6 (13.95%)	11 (25.58%)	7 (16.28%)
Item 5 Provides learning opportunities to improve aural skills	2.93	1.70	13 (30.23%)	7 (16.28%)	6 (13.95%)	7 (16.28%)	7 (16.28%)	3 (6.98%)
Item 6 Provides more control over learning process	3.28	1.62	9 (20.93%)	4 (9.30%)	13 (30.23%)	3 (6.98%)	11 (25.58%)	3(6.98%)
Item 7 Knows how to play video games	4.28	1.50	2 (4.65%)	5 (11.63%)	5 (11.63%)	9 (20.93%)	11 (25.58%)	11 (25.58%)
Item 8 Easy to play video games in classroom	2.88	1.79	15 (34.88%)	4 (9.30%)	11 (25.58%)	2 (4.65%)	6 (13.95%)	5 (11.63%)
Item 9 This video game should be used in the EFL classroom	3.67	1.81	7 (16.28%)	7 (16.28%)	6 (13.95%)	5 (11.63%)	9 (20.93%)	9 (20.93%)
Item 10 Vote in favour of using video games in EFL classroom	3.63	1.90	8 (18.60%)	7 (16.28%)	6 (13.95%)	6 (13.95%)	4 (9.30%)	12 (27.91%)

Table 5: Students' responses to the ten items about their perception of the video game.

The first area of interest is the comparison of the mean values of the different items. Item 7 has the highest mean value. This is the item that deals with the issue of video game experience. Many of the students were already experienced in playing video games. On the other hand, the participants' responses to the statement "Easy to play video in the classroom" resulted in the lowest mean of all ten statements in the questionnaire. On the surface, this appears to be ironic. This could be explained by students not being comfortable in using and playing a video game in the classroom for serious, educational purposes; they may be accustomed to playing video games for primarily entertainment purposes. This notion was born out in the interviews. In one interview, a student commented that he did not like playing video games in the classroom because video games were meant for fun and relaxing. This issue could be pursued in future research.

The second result that stands out is that students generally think that playing this video game would help them learn English. As can be seen in questions 1-3, the students generally agree that playing this video game helps them with developing their language skills, i.e., specifically, their oral skills, listening skills, and vocabulary development. This shows that many students have a positive attitude to using video games in the classroom for language learning purposes. Item 10 also seems to echo this sentiment. Students generally would vote for this game to be used in the classroom (presumably in future classrooms). However, the second strongest category in this statement is the complete opposite. Almost half of the students (47%) strongly agree or strongly disagree about voting for using this game in future classrooms. This polarized opinion may reflect the fact that some students really like or really dislike playing video games, especially in a classroom context. These results are quite informative as instructors go about investigating the role of pronunciation in their EFL classrooms.

Discussion

Improvement in Students' Pronunciation

As previously mentioned, the first research question was answered in the affirmative. The students in the EG who had played the mobile game as a way to practice their pronunciation outperformed those students who used paper-based pronunciation practice (i.e., CG). This clearly and unambiguously shows that the gameplay of the EG enhanced their pronunciation. The paper-based pronunciation practice was designed to parallel the mobile game-based pronunciation practice, so there was no unfair bias or orientation. The paper-based pronunciation activities that the CG engaged in parallel with the game-based practice activities that the EG engaged in in a number of ways. First, both kinds of activities used the same target vocabulary. This ensured that the words they were exposed to for pronunciation practice were identical. Second, the paper-based activities had pairs or trios of students interacting together by speaking the words in sentences. These CG students had to make themselves understood by their partners within a certain period of time (to achieve

the goal of the activity). The CG students may have had to interrupt each other to get their meaning across before the time limit ran out. In one such paper-based game, a group of CG students were tasked with imagining they were in a fighter airplane. Each student had cards that required them to communicate and be understood by others in a timely manner to ensure the airplane achieved its mission. All these features were fairly similar to the features of the activities that the EG were engaged in. Both groups of students experienced identical conditions (i.e., same amount and kind of practice), except for the mode of practice (i.e., practice with the help of a mobile game or practice with the help of paper-based activities).

The question that begs to be answered is what was it about playing a mobile game that caused participants to out-perform their paper-based counterparts. One clue to responding to this question can be found in the interviews. In some interviews students thought that playing the mobile game allowed them to focus on the game and not be distracted by looking at each other. They could express themselves without fear of failure that is more common with face-to-face encounters. Also, the thrill of playing the video game might have made the language learning more enjoyable and less laborious.

Students' Perceptions of Classroom Gameplay

In addition to pronunciation improvement, students reported a positive perception of playing this mobile game. They reported that to be true due to the questionnaire results. The students who had played the video game (i.e., EG participants) reported that the gameplay contributed to their language learning. This was reported in terms of oral skills and listening skills. Out of these skills, oral skills were deemed to have helped the most. This may have been because oral communications are more visible and seemingly active in the gameplay (i.e., the gameplay had students shouting commands at each other).

Research limitations

While this study revealed several interesting insights, a number of limitations were implicit in the study. First, some students may not accurately complete the questionnaire because they lack insight into knowing which learning activities actually help their learning. To get around this, future research could take this effect into account. The questionnaire items need to be designed to detect and cancel this effect. Second, students are naturally attracted to learning activities that involve "flashy" digital devices over "boring" paper-based activities. The students from the experimental group may wrongly attributed the excitement of using digital devices to learning development. They may wrongly call just mere affective factors as learning factors. Third, trying to analyze questionnaire results is an imperfect and controversial endeavor. Using the Mann-Whitney U test is a fairly reliable way to measure and compare the significance of student preferences between the control group and experimental group. Using this test in this way is not without controversy. Some researchers contend that this test has limited use or relevance to determine the level of significance between two groups in a set of questionnaire results. Future research could use alternative statistical measures to analyze the questionnaire results. Fourth, there is a possible technology barrier to using *Spaceteam ESL* effectively in the classroom. The nature of playing the video game means that pairs of players must ideally have access to a stable WiFi signal. This is no problem if the classroom has a stable WiFi signal (provided by the university itself or set-up somehow as a hotspot). But throughout the semester in this study, some students could not access a stable WiFi signal and had trouble "linking" with the other player. Alternatively, a Bluetooth signal could be shared between the players, but this necessitated that both students used the same type of smartphone (either an Apple device or an Android device, but not mixed).

Another limitation could be the short duration of the treatment for the EG. Students in the EG were tasked to play *Spaceteam ESL* for only 20 minutes in each class. This may not have created a long enough duration for students to practice their pronunciation. Future studies could have students play the game for longer periods or for several sessions during the class term.

Conclusion

This research was quite eye-opening in a number of ways. First, the research demonstrated the learning power that video games have for the language learning classroom. The video game makes the classroom a place where learning happens, but in a more enjoyable way. This can be clearly seen as students thought there were more learning opportunities and that video games should be included in the classroom. A language learning classroom that includes video games is more engaging and motivating. It encourages students to view language learning as something they can enjoy doing and not as a tedious task. Using video games in the classroom can encourage students to use video games "in the wild" — that is, in their daily, out-of-class life. This would help to move students towards becoming lifelong learners. Generally

speaking, the participants are not given opportunities for language learning outside the classroom. So, video games like the one in the study would be a good way to provide students with more opportunities to use and enhance their language skills.

Another way this research was eye-opening was the nature of the gameplay itself. It was quite interesting to note how EG participants significantly improved their pronunciation over their CG counterparts. The nature of the gameplay requires or forces players to speak to their teammates in a clear and concise manner without any hesitation. This motivates players to speak in such a way that their teammates can understand them. To articulate themselves well, they need to pronounce words well enough to be understood.

Other insights from using *Spaceteam ESL* for pronunciation practice is its practical use. As *Spaceteam ESL* can be played on mobile phones, the game can be played anywhere and at any time. This gives video games a great flexibility as players are no longer tied to desktop or laptop computers to play a video game.

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Appendix 1

Questionnaire: What do you think about video games?

This survey briefly examines the impact of video games on your English learning ability. Please answer the questions below. Thank you.

Part 1: Please answer the questions below. The questions below consist of six levels of answers. Check the number that fits your opinion.

	Statement	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1	This video game helped me learn new words and phrases in English.						
2	The video game was effective for improving my speaking skills.						
3.	The video game was effective for improving my listening skills.						
4	Playing the video game gave me many learning opportunities to improve my speaking skills.						
5	Playing the video game gave me many learning opportunities to improve my listening skills.						
6	Playing the video game gave me greater control over my learning process.						
7.	I know how to play video games in the classroom.						
8.	It is easy for me to play video games in the classroom.						
9.	This game should be used in my English classroom regularly.						
10.	If I had to vote, I would vote in favour of using video games in the classroom.						

Note: If you are interested in seeing the results of this study, then I would be happy to share the results with you. Please contact me for this information. Also, if there are more questions or concerns about this project or study, then please contact me at the contact info below. Also, if you are interested in joining a follow-up interview, then please contact me.

Appendix 2

Interview questions

1) What do you think of playing video games to improve your speaking and listening skills?
2) What is your experience in playing video games in the past?
3) Why do you like to play video games?
4) What is your experience in playing video games for language learning in the past?
5) How useful is this video game for improving your speaking and listening skills?
6) How does this video game help improve your speaking and listening skills?
7) How easy was the video game to play and succeed?
8) How would you describe how your speaking and listening has improved?
9) What are the reasons for video games to be used in the language learning classroom?
10) Do you think playing this video game at home or in class helps develop your speaking and listening skills?