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AN ONLINE INSTRUCTIONAL TOOL IN THE HIGH SCHOOL SPANISH FOREIGN LANGUAGE CLASSROOM: EFFECTS ON ACHIEVEMENT, ATTITUDE, AND ENGAGEMENT

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Abstract The use of technology in the Spanish foreign language classroom can provide learners rich authentic resources for learning new vocabulary terms. The purpose of the current action research study was to determine the effect of the technology assisted vocabulary instruction Wordplay on foreign language vocabulary retention, student attitudes, and student engagement in the Spanish foreign language classroom. The study involved 52 English-speaking high school students learning Spanish over an 8-week period. One class received traditional Spanish vocabulary instruction and the other received online Spanish vocabulary instruction with the website Wordplay. Achievement was measured using pretests, immediate, and 10-day delayed posttests. Findings indicated no significant difference in achievement between the groups, no significant difference between the two groups' attitudes toward knowledge and use of the Spanish language, and no significant difference in class participation levels between groups. Based on these findings, it was concluded that the use of Wordplay did not provide any advantages to students' acquisition of Spanish vocabulary.

Keywords: Foreign language, online instruction, high school, action research

Introduction

The ability to communicate in more than one language can provide individuals with increased opportunities for work, career, and travel. The high school Spanish classroom for English speakers is an important part of learning a new language and often one of the first settings where students first come to learn the language (Collins & Muñoz, 2016; Meli, 2009; Stager, 2010). However, there is a lack of national data to reflect student performance and achievement in this area. The most notable test is the Advanced Placement (AP) Spanish Language test taken by students across the United States. Results from the AP Spanish Language test ranging from years 2003 to 2013 indicate that the number of students scoring a one or two, considered an unsatisfactory score, has increased from 9.5% to13 % while and the number of students scoring a 5, a top score, has decreased from 31.9% to 24.5 % (College Board, 2016).

Teachers of foreign language, Spanish language in particular, recognize the lexical needs of foreign language learners and the importance of addressing this issue (Erbes, Folkerts, Gergis, Pederson, & Stivers, 2010; Lugo-Neris, Jackson, & Goldstein, 2010; Palapanidi, & Agustín Llach, 2014). Determining effective ways to increase students' second language (L2) vocabulary acquisition can improve teaching practices, learners' confidence with second language (L2) acquisition and student achievement in L2 communicative competency (Erbes et al., 2010; Larrotta, 2011). The use of technology in the Spanish foreign language classroom (FLC) can provide learners with rich authentic resources for learning L2 (Chen & Chung, 2012; Wang & Vásquez, 2012). The purpose of the current action research study was to determine the effect of the technology assisted vocabulary instruction Wordplay on foreign language vocabulary retention, student attitudes, and student engagement in the Spanish FLC. This study may inform decisions about the use of Wordplay as a strategy for improving vocabulary acquisition in the Spanish FLC.

Literature Review

Vocabulary Knowledge. A language is composed of various elements that interact simultaneously to facilitate communication. Some of those elements include lexical knowledge, grammatical competence, semantic and pragmatic abilities, syntactic structures, and morphological recognition (Language, 2016). Despite the many moving parts of a language, some researchers argue that vocabulary acquisition is central to second language acquisition (SLA) (Reynolds, 2015; Roseley Santos & Phalangchok, 2015). While grammatical competence is also important, if students do not know enough vocabulary to execute the grammatical skill they are mastering, their communicative abilities are diminished (Roseley Santos & Phalangchok, 2015). On the other hand, communication in the L2 is not always impeded by grammatical errors provided that the speaker is able to produce adequate vocabulary for the situation. For example, one could order a meal without conjugating verbs correctly or making errors in word order as long as adequate vocabulary is used to convey general meaning. Likewise, beginning learners of an L2 will often obtain and

decipher meaning according to the vocabulary they hear rather than attending to grammatical structures (Larrotta, 2011).

Vocabulary knowledge is central to communicative skills. Vocabulary knowledge has been linked to growth in reading comprehension (Jung, 2016; Lervåg & Aukrust, 2010; Reynolds, Wei-Hua, Hui-Wen, Shu-Yuan, & Ching-Hua, 2015). A number of researchers suggest that a strong proficiency in learner's first language (L1) facilitates vocabulary acquisition in the second language (Jung, 2016; Norman, Degani, & Peleg, 2016; Türker, 2016). Furthermore, acquiring and retaining new vocabulary is important for supporting a strong lexical base to develop fluency in the L2 (Larrotta, 2011). Vocabulary acquisition and lexical knowledge are fundamental in SLA; however, these skills may prove to be difficult for some language learners.

Receptive knowledge is the ability to recognize a structure or concept after receiving explicit instruction, while expressive or productive knowledge is the ability to utilize the structure or concept after instruction and usually after an extended period of time. Expressive knowledge hinges on a learner's ability to retain information. Studies show that lexical retention levels tend to be poor thereby negatively affecting productive knowledge and a learner's ability to communicate (Chen & Truscott, 2010). However, explicit vocabulary instruction in classroom settings, such as "direct contrasts with L1 words or dictionary use", was deemed effective in learning initial word forms (Chen & Truscott, 2010, p. 711; Peters, 2014).

Numerous instructional strategies for facilitating vocabulary acquisition and retention have been suggested. Lugo-Neris et al. (2010) and Stager (2010) found that the use of vocabulary flashcards was an effective tool for the acquisition of vocabulary for all learners. Larrotta (2011) found that the use of personal glossaries requiring learners to internalize vocabulary in a variety of ways was an effective method for vocabulary acquisition with Spanish speaking adults learning English as a second language. In their study of university students learning Spanish, Sagarra and Alba (2006) found that the keyword method facilitated the highest levels of retention, followed by rote memorization and semantic mapping. Glossing, a process of transcribing one language to another through visual word patterns, was found to increase vocabulary retention (Jung, 2016). While many of the instructional methods proved to be beneficial, it is likely that a combination of several strategies is most effective.

Online Instructional Tools. The use of technologies in the FLC can provide learners with rich authentic opportunities for learning L2 (Chen & Chung, 2012; Wang & Vásquez, 2012). Studies on the benefits of technology use to learn langauge in the FLC has produced mixed results. The wide array of available technology resources makes it difficult to compare results and make generalizations. For example, some studies indicate that the use of multimedia and hypermedia resources in the classroom do not greatly improve student

achievement or learner attitudes (Meli, 2009; Yanguas, 2012). However, in a meta-analysis of computer-assisted second langauge vocabulary instruction, Chiu (2013) found that (a) vocabulary acquisition was higher for students who used computer assisted langauge learning (CALL) for less than a month compared to students who used CALL longer than a month, (b) adolescents benefit more from CALL then younger learners, and (c) that CALL's flexibility for independent learning benefits the learner's vocabulary learning more than the aid of the teacher. However, Collins and Muñoz (2016) contradict the last finding stating that teachers serve important roles as language and technology experts facilitating the learning process.

While many studies have emerged in recent years regarding vocabulary acquisition and SLA, there are still gaps in the body of research. Current studies report on vocabulary acquisition and retention for adult and very young learners and English language learners. Few studies report on secondary level students in the Spanish FLC. In addition, there are fewer studies about Spanish as L2 than those found within the ESL context. No study has addressed the effect of learner's vocabulary acquisition on classroom engagement. Studies combining the use of technology in the high school Spanish as a foreign language class are scarce at best.

Purpose of Research

In the research site's school improvement plan, teachers were encouraged to integrate technology into instruction. Furthermore, a need to increase retention of new vocabularies taught in the Spanish FLC was pressing (Pine, 2009). A free online program for improving Spanish vocabulary, Wordplay, was chosen for implementation for its multimodal approach and for its potential to improve vocabulary knowledge and retention.

The purpose of the current study was to investigate the use of Wordplay in the Spanish FLC, and its effect on student vocabulary retention, students' attitudes toward their knowledge and use of the Spanish language, and student engagement in the Spanish FLC. The effectiveness of the online vocabulary instruction through Wordplay was determined by a comparison to direct vocabulary instruction, which included class activities and readings, textbook-based activities, and homework. The research questions are as follows:

1. Will high school Spanish students' achievement increase using online vocabulary instruction through Wordplay compared to direct vocabulary instruction?
2. Will high school Spanish students' attitudes increase using online vocabulary instruction through Wordplay compared to direct vocabulary instruction?
3. Will high school Spanish students' engagement using online vocabulary instruction through Wordplay compared to direct vocabulary instruction?

Methodology

Action research is a qualitative research approach and methodology that is participatory, practical, technical, context based and focused on addressing real pedagogical challenges and solutions to benefit teaching and learning (Denzin & Lincoln, 2000). Action research provides teacher-researchers opportunities to examine teaching and reflect on their practices. First, teacher-researchers plan to study a problem. They then identify an area of focus, determine how to collect, analyze and interpret data, and as a concluding step, they develop a plan of action (Creswell, 2012). Second, as part of research teams seeking to improve practice and learning, teacher-researchers agree on an intervention, based on best practices for researching, to implement in their classroom for an assigned time span. Thirdly, teacher-researchers make observations and collect data using instruments. Finally, teacher-researchers evaluate and reflect on data and make conclusions about their practices (Kemmis, & McTaggart, 1998 as cited in Nelson, 2013). Important here is that teacher-researchers are immersed in the context, experiencing the classroom, and configuring patterns of teaching and learning (Pine, 2009).

Hubbard and Power (1993) also suggest that teacher action research address open-ended questions, rather than questions producing yes or no responses often inherent in positivistic research designs. In this vein, the teacher-researcher in this study sought to address open-ended, context embedded questions to examine the effectiveness of a teaching tool to help her students learn new vocabulary (Shagoury & Power, 1993). As such, multiple data sources were used to draw on multiple perspectives and to capture the complexity of school learning contexts (Pine, 2009).

Action research is context based, thus generalizability to other contexts is not presumed (Denzin & Lincoln, 2000). The mixed methods approach was used in this study with data gathered through instruments and observations. Quantitative data collection specifically included an achievement measure. According to current practice in the state where the research was conducted, and in most states since the inception of No Child Left Behind, progress on goals related to school improvement and choices of teaching strategies must be based on data, with achievement as the ultimate indicator. Thus, this study used content-based pre-and posttests to measure student achievement on Spanish vocabulary as the result of interacting with Wordplay. The administration of pre-posttests is also reflective of common classroom assessment practices. In addition, for expediency purposes, a survey on students' opinions of the use of Wordplay was administered to gather students' attitudes toward learning Spanish vocabulary with this technology. As a qualitative measure, teacher-researcher observations were recorded in a student engagement checklist and field notes to gauge students' engagement with learning new vocabulary using Wordplay.

The teacher-researcher used both quantitative and qualitative approaches to provide a more balanced approach to data collection and analysis and increase confidence in study's

results (Jick, 1979). In this study, data triangulation was accomplished using student achievement data supplemented with attitudinal data and teacher-researcher field notes of student engagement. Common themes were identified from the data triangulation process (Patton, 2002).

Setting and Participants. This study was conducted in a rural secondary school located in the southeast region of the United States. At the time of the study, City High School, a pseudonym, had approximately 3,001 students, with percentage of enrollment by race and ethnicity of 68% White, 24% Black, 5% Hispanic, 2% Multiracial, and 1% Asian (State Department of Education, 2012). Thirty-eight percent of the student population was eligible for free or reduced-price meals in 2010-2011 (State Department of Education, 2012).

The research participants in this study were high school students (*N* = 52) enrolled in two Spanish II courses, having passed the prerequisite Spanish I course. Convenience sampling was used to select the participants in the direct vocabulary group (*n* = 24) in first block Spanish II and the technology assisted vocabulary instruction group (*n* = 28) in fourth block Spanish II. Participants' grade levels ranged from 10^{th} to 12^{th}, and the average age was 16.5 years. The demographics for both groups of participants are listed in Table 1.

Table 1: Demographic Data for Direct Vocabulary Instruction Class and Technology Assisted Vocabulary Instruction Class

Characteristic	**Direct Vocabulary Instruction Class** ***n* = 24**	**Technology Assisted Vocabulary Instruction Class** ***n* = 28**
Gender		
Male	11	13
Female	13	15
Race/Ethnicity		
White	17	21
Black	6	7
Multiracial	1	0

Students with Disabilities	2	3
Gifted	3	5

Participants were approximately 75% White and 25% Black. Each class had a small number (five or fewer) of students identified as having a disability or being gifted. The first block class was designated as the technology assisted vocabulary instruction class and served as the treatment group.

The teacher-researcher, who held Bachelor's and Master's degree in Spanish, was the instructor of the Spanish as a foreign language course, and had been teaching for 6 years. The teacher-researcher collaborated with critical friends (Pine, 2009) including (a) fellow teachers regarding effective ways to measure student achievement and engagement in the Spanish FLC, and in peer reviewing data collection instruments, and (b) two university professors regarding study design and data analysis. The two university professors were previous teachers and administrators of public schools and teach college courses in school contexts. The professors assisted the teacher-researcher in the research process; however, they were not involved with the execution of the study or with student participant instruction. In addition, a collaboration with the school leader, teacher-researcher, and professors was established to examine and approve the research study as consistent with school and district goals, procedures, and policy requirements (Pine, 2009). The teacher-researcher had completed a nationally approved certification related to work with vulnerable populations and conducted the research under the approval of a university Internal Review Board.

Intervention. Students in both the direct vocabulary instruction class and the technology assisted vocabulary instruction class received 90 minutes of daily instruction from the teacher-researcher over the 8-week period during which the intervention was implemented. The 8 weeks of research occurred at the beginning of the semester after the preliminary unit of study was taught. During the intervention period, both groups received instruction on the same two units of study covering the theme of travel and the themes of sports and daily routines. Each unit included vocabulary and grammar quizzes and chapter assessments. The same lessons, activities, practice times, pacing, quizzes, and assessments were used for both classes.

During the intervention period, students in the direct vocabulary instruction class used class time to create flashcards for new vocabulary. Students in the technology assisted vocabulary instruction class were registered for accounts on the online Spanish vocabulary website Wordplay and were instructed one time for 10 minutes on use of the website. They

played the online vocabulary game for at least 30 minutes on 1 lab day per week during the 8-week intervention period. However, students were encouraged to complete some of the required 30 minutes a week on their own time as part of regularly scheduled homework assignments. Participants in the direct vocabulary instruction class studied new vocabulary in the same ways as in previous units of study and in their previous Spanish I class during matching time periods.

The website Wordplay presented vocabulary in the form of digital flashcards, including visual and audio cues, and games. Vocabulary lessons on the Wordplay website were tailored by the teacher-researcher for the specific units of study. The website individualized Wordplay activities for each student. On logging in, students were prompted to review vocabulary words not yet mastered. As students continued to use the activities, the program scheduled regular reviews of vocabulary based on prior performance. Students completed activities utilizing current vocabulary and previously studied vocabulary, and they tracked progress using a meter of the percentage of mastery and retention of new vocabulary. The teacher-researcher accessed student progress and login time.

Vocabulary retention was assessed separately from grammar and overall chapter assessments through use of vocabulary pretests, immediate posttests, and delayed posttests for each of the two units studied over the 8-week research period. Pretests and posttests were the same for both groups and consisted of matching Spanish vocabulary words with their English meanings. The same vocabulary tests were administered 10 days after the two units of study and served as delayed posttests of vocabulary retention. Scores provided data for determining whether vocabulary retention was affected by method of vocabulary practice.

A survey measured students' attitudes toward their knowledge and use of the Spanish language, and an observation checklist form and field notes were used weekly by the teacher-researcher to compare levels of class engagement for both groups. All instruments are described in the data collection section.

Data Collection. The teacher-researcher collected data from two student groups to determine the effect of technology assisted vocabulary instruction through Wordplay on student vocabulary retention, attitudes, and behavior. Data collection instruments included vocabulary tests for two units of study, an attitude survey, and an instrument for recording observations of student engagement.

For each of two units of study, vocabulary pretests, immediate posttests, and delayed posttests were administered to all student participants. Two units of study were used to improve reliability of conclusions. Vocabulary Test 1 and Vocabulary Test 2 were developed

by the teacher-researcher with the help of two teacher colleagues, and instrument validity was established by peer review and peer collaboration. Reliability was established by administering the tests to two high school Spanish II classes in the semester prior to the implementation of the intervention (Creswell, 2012).

Throughout the study period, both classes completed the same tests at the same times. To determine vocabulary achievement, a vocabulary pretest was given prior to the start of instruction of each unit, a unit vocabulary test was given at the conclusion of instruction on the same day as the chapter test, and the same vocabulary test was given 10 days after the conclusion of each unit of study. The vocabulary tests consisted of 28 matching questions, and the words selected for the test were not considered to be cognates, or words that are similar in Spanish and English.

Scores for all vocabulary tests were reported as a percentage of the number of correct answers. After scores were established for each test administration (pretest, immediate posttest, and delayed posttest), data were analyzed using descriptive statistics (*M*, *SD*) and one-tailed *t*-tests to determine whether students in the technology assisted vocabulary instruction class demonstrated more positive gains and higher retention of new vocabulary than students in the direct vocabulary instruction class (Creswell, 2012).

The Attitude Toward Spanish Skills (ATSS) survey was developed by the teacher-researcher and consisted of 10 questions. The Likert-scale response options ranged from 1 (*strongly disagree*) to 5 (*strongly agree*) with 3 being *neutral*. The ATTS survey was administered to both groups before the intervention period began, and again to both classes at the conclusion of the second unit of study. Survey questions were designed to elicit student responses about confidence levels in learning and using the language, as well as attitudes toward use of supplemental technology tools. Responses were analyzed using descriptive statistics (*M*, *SD*) and a one-tailed *t*-test to determine whether or not the technology assisted vocabulary instruction class demonstrated more positive attitudes about their Spanish skills than the direct vocabulary instruction group. Validity of the instrument was established through peer review by a university professor and teacher colleagues at the research school (Creswell, 2012). Reliability of the instrument was established in a pilot study two semesters prior to the implementation of the present study.

A Participant Observation Instrument (POI) was developed by the teacher-researcher to record engagement for both classes. The POI was utilized 8 days during the intervention period, including 4 days during Unit 1 and 4 days during Unit 2. Engagement was observed and recorded on days during which activities were explicitly designed to elicit students' oral engagement. Students received one or more check marks under the day they participated orally in Spanish in class. At the end of the intervention period, students' scores were totaled and averaged to yield a mean class engagement score. Data were analyzed using descriptive statistics and a one-tailed *t*-test to determine whether or not students in the

technology assisted vocabulary instruction class demonstrated higher levels of class engagement than students in the direct vocabulary instruction class.

Results

The current study examined the effect of technology assisted vocabulary instruction on vocabulary retention, students' attitudes toward their knowledge and use of the Spanish language, and in-class student engagement in the target language L2, and results from each instrument are reported here.

Vocabulary Retention Achievement. Student vocabulary learning was measured for two units of study conducted over 8 weeks. Assessments included vocabulary pretests, immediate posttests, and 10-day delayed posttests. Results of the pretest and immediate posttest for Unit 1 for the direct vocabulary instruction group (n = 24) and the technology assisted vocabulary instruction group (n = 28) are presented in Table 2. Both the direct vocabulary group ($t(24) = -21.59$, $p < .001$) and the technology assisted group ($t(28) = -26.35$, $p < .001$) scored statistically significantly higher on the Unit 1 immediate posttest than the pretest, indicating that both participant groups made significant gains in vocabulary acquisition for Unit 1.

Table 2: Vocabulary Test 1: Comparison of Pretest and Immediate Posttest

	Pretest		**Immediate Posttest**		**Mean Increase**	**Comparison of Means**	
	M	*SD*	*M*	*SD*		*t*-value	*p*
TVI (*n* = 24)	17.50	12.34	89.25	13.44	71.75	-21.59	< .001***
TAVI (*n* = 28)	17.39	12.46	87.11	16.89	69.72	-26.35	<.001***

Note. TVI = direct vocabulary instruction group; TAVI = technology assisted vocabulary instruction group.

*$p < .05$, **$p < .01$, ***$p < .001$

The direct vocabulary group scored slightly higher on the immediate posttest (M = 89.25) than the technology assisted vocabulary group (M = 87.11), but the difference in the scores was not statistically significant ($t(52) = -.50$, p = .31). These results indicated that the

acquisition of new vocabulary was comparable for both participant groups for Unit 1. The treatment had a negligible effect (*d* = .14) on immediate vocabulary gains when compared to gains after direct instruction.

In order to measure levels of vocabulary retention, participants in the direct vocabulary instruction group and technology assisted vocabulary instruction group were administered a Vocabulary Test 1 delayed posttest. The results comparing the immediate and delayed vocabulary posttests for Unit 1 for both participant groups are presented in Table 3.

Table 3: Vocabulary Test 1: Comparison of Immediate Posttest and Delayed Posttest

	Immediate Posttest		**Delayed Posttest**		**Mean Increase/ Decrease**	**Comparison of Means**	
	M	*SD*	*M*	*SD*		*t*-value	*p*
TVI (*n = 24*)	89.25	13.44	87.33	16.99	-1.92	1.21	.12
TAVI (*n = 28*)	87.11	16.89	82.29	21.37	-4.82	2.65	.01*

Note. TVI = direct vocabulary instruction group; TAVI = technology assisted vocabulary instruction group.

*$p < .05$, **$p < .01$, ***$p < .001$

The delayed posttest scores for both groups showed a decrease from the immediate posttest scores for vocabulary in Unit 1, indicating participants were not able to retain all new vocabulary learned. The difference between the direct vocabulary group's immediate ($M = 89.25$) and delayed ($M = 87.33$) posttest scores was not found to be significant ($t(24) = 1.21$, $p = .12$). However, the difference in the immediate ($M = 87.11$) and delayed ($M = 82.29$) posttest scores for the technology assisted vocabulary group was found to be statistically significant ($t(28) = 2.65$, $p = .01$), indicating that students who learned Unit 1 vocabulary through the use of technology demonstrated a significant loss in retention after a delay of 10 days. The treatment had a small negative effect ($d = .26$) on retention after delay.

A pretest, immediate posttest, and delayed posttest for Unit 2 were also administered to both instructional groups, and a comparison of those results are in Table 4.

Table 4: Vocabulary Test 2: Comparison of Pretest and Immediate Posttest

	Pretest		**Immediate Posttest**		**Mean Increase**	**Comparison of Means**	
	M	*SD*	*M*	*SD*		*t*-value	*p*
TVI (*n = 24*)	13.29	8.48	84.96	22.31	71.67	-16.59	<.001***
TAVI (*n = 28*)	9.64	7.45	80.11	24.64	70.47	-16.65	<.001***

Note. TVI = direct vocabulary instruction group; TAVI = technology assisted vocabulary instruction group.

*p < .05, **p < .01, ***p < .001

As seen in Table 4, results were similar to those for Unit 1. For Unit 2, both participant groups scored higher on Vocabulary Test 2 immediate posttest than the pretest. The differences in the pretest and immediate posttest scores were found to be statistically significant. Both participant groups made significant gains in vocabulary acquisition for Unit 2. However, when statistically compared, the difference between the mean increases was not found to be significant ($t(52) = -.74$, $p = .23$). This finding indicated that the acquisition of new vocabulary was comparable for both participant groups for Unit 2.

A Vocabulary Test 2 delayed posttest measured levels of vocabulary retention. The results of the Unit 2 immediate and delayed posttests for both participant groups are presented in Table 5.

Table 5: Vocabulary Test 2: Comparison of Immediate Posttest and Delayed Posttest

	Immediate Posttest		**Delayed Posttest**		**Mean Increase**	**Comparison of Means**	
	M	*SD*	*M*	*SD*		*t*-value	*p*
TVI (*n = 24*)	84.96	22.31	82.88	19.78	-2.08	1.02	.16
TAVI (*n = 28*)	80.11	24.64	77.00	27.53	-3.11	1.39	.09

Note. TVI = direct vocabulary instruction class; TAVI = technology assisted vocabulary instruction class.

The delayed posttest scores for both participant groups decreased from the immediate posttest scores for Unit 2. Decreases in delayed posttest scores indicated that, similar to results in Unit 1, participants were not able to retain all new vocabulary learned; however, the differences were not statistically significant for either group. Also, while both groups demonstrated a decrease in the mean score on the delayed posttest, the difference between the delayed posttest scores of the two groups was not found to be statistically significant ($t(52) = -.87$, $p = .19$).

These results support the conclusion that both group of participants did not demonstrate a significant loss in retention for Unit 2 vocabulary, and retention levels of Unit 2 vocabulary were comparable between groups. Students who learned vocabulary through technology did not retain significantly more or less Unit 2 vocabulary than students who did not use technology.

Considering all achievement measures of vocabulary knowledge and retention, both methods of vocabulary practice resulted in significant increases in vocabulary knowledge for both units during the study. The vocabulary tests for each unit, administered after a 10-day delay, resulted in a significantly reduced retention only during Unit 1, and only for the group utilizing technology.

*Attitudes***.** Both the direct vocabulary instruction group and the technology assisted vocabulary instruction group were administered a 10-item survey prior to and after the conclusion of the intervention period to measure students' attitudes toward their language skills. Survey responses utilized a Likert-scale with the following ratings: 1 (*strongly*

disagree), 2 (*disagree*), 3 (*neutral*), 4 (*agree*), and 5 (*strongly agree*). The results of the pre- and post-intervention surveys for both groups are presented in Table 6.

Prior to the intervention period, students responded positively to the majority of the survey items. In particular, students in both groups were strongly positive about survey item eight, indicating they would be more comfortable participating in class with a better understanding of vocabulary. As seen in Table 6, with only one exception, students responded more favorably on all survey questions at the conclusion of the intervention period. The exception was a slight decrease (- 0.03) in the mean response for technology-assisted students on the importance of learning Spanish as a second language. Significantly more positive responses were given by both groups for enjoyment of learning Spanish (item 1), general ease of learning Spanish (item 3), and confidence about Spanish skills in the classroom (item 4).

On items 5, 9, and 10, the direct group means were significantly more positive after the intervention period, but the technology assisted group means were not. Those items related to the importance of learning Spanish grammar (item 5), the use of online tools to improve Spanish skills (item 9), and the need to require use of online resources in vocabulary work (item 10). For items 9 and 10, one possible explanation is that students who did not use Wordplay may have experienced an initial interest, perhaps because they had no access to the program while those students using the online resource considered it to be a regular part of the work with vocabulary learning.

Table 6: Comparison of Direct and Technology Assisted Vocabulary Group Survey Responses

	Pre-intervention Survey		**Post-intervention Survey**			
Survey Item	*M*	*SD*	*M*	*SD*	Gain	*p*
1. I enjoy learning Spanish.						
Direct	3.33	.87	3.63	1.06	.30	<.01**
Technology Assisted	3.39	.99	3.71	.85	.32	.03*
2. I think it is important to learn Spanish as a second language.						
Direct	3.46	.93	3.63	.88	.17	.16
Technology Assisted	3.64	.68	3.61	.83	-.03	.31

3. In general, I find it easy to learn Spanish.						
Direct	3.00	.88	3.71	.81	.71	<.00***
Technology Assisted	3.07	1.18	3.50	1.00	.43	<.00**
4. In general, I feel confident about my Spanish skills in the classroom.						
Direct	3.13	.80	3.63	.71	.50	<.01**
Technology Assisted	3.11	1.10	3.57	.92	.46	<.01**
5. I think learning Spanish grammar is very important.						
Direct	3.42	.72	3.75	.94	.33	.04*
Technology Assisted	3.79	.99	3.82	.90	.03	.41
6. I think learning Spanish vocabulary is very important.						
Direct	3.83	.76	4.08	.65	.25	.09
Technology Assisted	4.04	.64	4.14	.84	.10	.24
7. I don't mind making grammatical mistakes while speaking/participating in Spanish class.						
Direct	3.04	1.08	3.25	1.15	.21	.24
Technology Assisted	3.36	1.06	3.75	.70	.39	.03*
8. I feel more comfortable participating in class when I have a good grasp on the vocabulary in the unit.						
Direct	4.25	.90	4.29	.91	.04	.41
Technology Assisted	4.18	.86	4.25	.65	.07	.32
9. Using online activities is a good way to improve my Spanish skills.	3.67	.96	4.04	1.20	.37	.02*

Direct	3.68	.86	3.89	.83	.21	.13
Technology Assisted						
10. The use of outside resources, such as online activities, should be a required assignment in a foreign language class.						
Direct	2.92	1.21	3.42	1.35	.50	<.00***
Technology Assisted	3.39	1.03	3.54	.88	.15	.16

*$p < .05$, **$p < .01$, ***$p < .001$*

Both participant groups showed significantly more positive responses on survey items 1, 3, and 4. To determine whether there were significant differences in post-intervention response levels on those items, post-intervention responses were analyzed using descriptive statistics (*M*, *SD*) and a one-tailed *t*-test. Results from these analyses are presented in Table 7. None of these post-intervention response differences were found to be statistically significant between participant groups, supporting the conclusion that the attitudes of students who learned vocabulary by using technology were not significantly different from those of students who did not use technology.

Table 7: Comparison of Participant Groups' Post-Intervention Survey Responses

	TVI (*n = 24*)		**TAVI (*n = 28*)**		**Comparison of Means**	
Survey item	*M*	*SD*	*M*	*SD*	*t*-value	*p*
1. I enjoy learning Spanish	3.63	1.06	3.71	.85	.34	.37
3. In general, I find it easy to learn Spanish	3.71	.81	3.50	1.00	-.82	.21
4. In general, I feel confident about my Spanish skills in the classroom.	3.63	.71	3.57	.92	-.23	.41

Note. TVI = direct vocabulary instruction group; TAVI = technology assisted vocabulary instruction group.

*Engagement***.** Throughout the 8-week intervention period, the teacher-researcher recorded student class engagement eight times: 4 days during Unit 1 and 4 days during Unit 2. Though no baseline had been established prior to the intervention, comparison of class engagement during the intervention could be determined by comparing changes in student engagement levels. Each time a student participated orally in the target language in class, they received a check mark. The two participant groups' scores were analyzed using descriptive statistics (*M*, *SD*) and a one-tailed *t*-test. Table 8 presents the results of these analyses.

Table 8: Comparison of Participant Groups' Engagement Scores

	Mean Engagement	***SD***	**Comparison of Means**	
			t-value	*p*
TVI (*n = 24*)	5.96	5.20	.37	.36
TAVI (*n = 28*)	6.50	5.21		

Note. TVI = direct vocabulary instruction group; TAVI = technology assisted vocabulary instruction group.

As seen in Table 8, the mean engagement score for the direct vocabulary group (*M* = 5.96) was slightly lower than the mean engagement score of the technology assisted vocabulary group (*M* = 6.50), but was not found to be significantly lower. Students who learned vocabulary by using Wordplay did not have higher or lower levels of engagement than students who did not use Wordplay. Lastly, field notes indicate that students were interested in using technology as a novel way to learn vocabulary and as a strategy that reflects contemporary digital learning experiences.

Discussion

To address the first research question on whether the use of online vocabulary instruction through Wordplay would improve students' acquisition and retention of new vocabulary, the teacher-researcher administered and analyzed assessments from two units of study. Over the two units, students in the two groups did not have statistically different gains based on comparison of pretests and immediate posttests. On delayed posttests (10 days after the end of each unit), the technology assisted vocabulary instruction group scored significantly lower on the delayed Unit 1posttest, but no significant difference was found in delayed posttests for Unit 2. Results support a conclusion that both groups had similar levels of retention on immediate tests, and that Wordplay did not have a significant effect on vocabulary retention for the technology assisted vocabulary group. The significantly greater loss of retention for the technology assisted group on Unit 1 but not on Unit 2 provided inconclusive evidence of any difference in long-term retention of second language vocabulary words.

Both participant groups made significant gains between the pre- and immediate posttests for both units, supporting the conclusion that both instructional methods were effective for students who had no previous contact with the new vocabulary. This finding also supports a conclusion that the online vocabulary instruction intervention did not increase students' levels of vocabulary retention on immediate posttests. Findings from this study were

consistent with previous literature (Meli, 2009; Yanguas, 2012) and suggest that technology does not increase student vocabulary achievement in foreign language class.

To determine whether students using the technology assisted vocabulary instruction Wordplay experienced more positive attitudes toward their knowledge and use of the Spanish language, evidence from survey results was considered. After the intervention, both participant groups' responses were significantly more favorable on three survey items. When comparing the survey responses between participant groups, however, the results indicated that there was no significant difference in the groups' attitudes on those survey items. These findings support the conclusion that, while both groups were more favorable to language learning, the online vocabulary instruction intervention did not have a significant positive effect on students' attitudes.

To determine whether student engagement levels were greater when technology was used in Spanish vocabulary instruction, observation instrument results were analyzed. The difference between the two groups' engagement scores was not found to be statistically significant, indicating that both groups participated at similar rates. Students' use of the online vocabulary instruction Wordplay did not result in significantly higher engagement levels.

Current literature does not report on the effect of technology on classroom engagement. This study's findings regarding classroom engagement were similar to the results regarding achievement and student attitudes. In conclusion, the use of technology does not appear to generate more positive effects on classroom engagement and Spanish language learning during this study period.

Educators understand the importance of vocabulary acquisition and retention in a second language (L2). Finding strategies for improving lexical retention would benefit overall student achievement in all areas of communicative competence (Larrotta, 2011). This study's findings indicate that the use of Wordplay did not significantly increase student vocabulary retention levels. Furthermore, Wordplay did not have a significant effect on student engagement in the target language L2. While the use of an online instructional tool may have appealed to students' contemporary way of learning digitally, it did not improve student learning within the study time period.

Implications and Conclusion

Findings of this study are consistent with previous research reporting that the use of technology does not necessarily provide significant advantages to students (Meli, 2009; Yanguas, 2011). More specifically, the use of the online vocabulary website Wordplay did

not significantly improve student achievement, student engagement, or student attitudes. The teacher-researcher will continue to seek effective technology for classroom use. In addition, findings of this study will be shared with other teachers at the research school with the aim of finding and utilizing other technological tools that may provide advantages to students in the area of vocabulary acquisition and retention.

It is also possible that online programs such as Wordplay can be used as a resource to provide variety and differentiation in instruction. This study was important for foreign language education in general as it addressed a gap in the literature regarding high-school students and technology in the classroom. Future studies of online vocabulary learning programs might be more generalizable if a larger and more diverse pool of participants were used. In addition, the participant groups in the current study did not have large numbers of students with disabilities. Further research might be focused on identifying an extensive set of online resources that are useful for enhancing various aspects of Spanish (or other) language instruction, and identifying what aspects the resources most appropriately address. Teachers can then have a research-based set of effective online resources that can be tailored for use to support the specific needs of their current students. An interesting avenue for future research would be examining the use of technology as a supplemental language tool for students with disabilities and for gifted students to determine whether certain student groups benefit more from specific types of language instruction.

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