



Language learner attitudes, technology attitudes, and technology prevalence at the secondary level

 Castledown

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This quantitative study explored how secondary world language (WL) learners' attitudes about computer-assisted language learning (CALL) were related to their attitudes and self-confidence about their language class and the prevalence of computer usage in their language classroom. Research has suggested positive correlations between these factors, but it has focused on learner attitudes about specific technological tools, not on CALL as an integral, regular, consistent component of the learning process. An 81-item online survey was administered to WL learners of Spanish, French, and German in 37 US secondary schools in one Midwestern state (N = 1031). The results indicated several strong positive correlations: (1) between learner attitudes about the use of technology in their language class and learner attitudes and self-confidence about their language class, and (2) between the prevalence of computer usage in their language classroom, learner attitudes and self-confidence about their language class, and learner attitudes about the use of technology in their language class. Additionally, even a once-a-week usage of computers correlated with more positive attitudes about language class. The study thus suggests that secondary WL learners experience CALL as an integral, normalized part of the language classroom, and that the attitudinal benefits of more computer usage can be leveraged to enhance all learning.

Keywords: learner attitudes, survey, secondary schools

Introduction

With the continued growth and influence of technology in the classroom, researchers across a variety of educational contexts have sought to examine how learner attitudes and beliefs about technology relate to the ways that the learners learn. These studies have often concluded that learners drive the success of technology integration (e.g., Gikas & Grant, 2013; Hatlevik *et al.*, 2018; Mao, 2014). Within research on CALL (computer-assisted language learning), a substantial body of studies has provided us with information on the ways that learner attitudes relate to the use of technological tools in the language classroom (e.g., Castañeda, 2013; Elola & Oskoz, 2010; Li, 2018; T.-Y. Liu & Chu, 2010; C.-C. Liu *et al.*, 2016; Y.-C. Wang, 2015; Zhonggen *et al.*, 2019). These studies have revealed a number of important themes and patterns in learner attitudes and CALL. For instance, in many cases, these studies have identified generally positive attitudes on the part of learners in the WL classroom, concluding that the tools or the group of tools has added to their motivation or interest in the class (Castañeda, 2013; T.-Y. Liu & Chu, 2010; C.-C. Liu *et al.*, 2016; Y.-C. Wang, 2015; Zhonggen *et al.*, 2019). In cases where negative attitudes were identified, researchers often cited the mechanics or interactivity of the tool as the main source of the negativity (e.g., Elola & Oskoz, 2010; Li, 2018). However, these studies have also focused on providing in-depth knowledge about specific technological tools or groups of tools (e.g., blogs, wikis, e-book readers, smartphone apps) without necessarily treating the breadth of the learner experience in learning environments where multiple, varied technology tools are used and integrated into instruction in a variety of ways by the teacher (Sydorenko *et al.*, 2017). This study aims to address that gap by examining the ways in which secondary (junior high/high school) learners' attitudes about technology are related to and embedded in other components of WL (world language; meaning non-English language in the US) learning.

In this, our study takes the perspective proposed by Kessler (2018), wherein we integrate our consideration of CALL into “the learning environment and experience” (Kessler, 2018, p. 208). Kessler’s 2018 article warned against making generalizations about technological tools, suggesting that researchers and teacher educators must take into account the broader learning context as well as the function and version of the tool. The widespread increase in technology usage and the increased variety of technologies available to teachers, Kessler argued, has upended the ways that researchers have traditionally organized CALL research around tools (Kessler, 2018). This perspective reflects what many scholars have recommended in CALL research: that CALL be studied not just in terms of specific tools that are deployed from time to time in the classroom, but rather as an integral, regular, consistent component of the learning process (Chapelle, 2001; Stockwell & Reinders, 2019; Sydorenko *et al.*, 2017; S. Wang & Vásquez, 2012; Warschauer, 2002). As such, we are examining CALL as something that has been normalized in the classroom, where technology “is so embedded in our practice that it ceases to be regarded as either a miracle cure-all... or something to be feared” (Chambers & Bax, 2006, p. 465). This lens



on CALL also reflects the realities of technology usage in the time of COVID-19, where language teachers have been required to substantially integrate and embed technology usage in every hybrid, distance, and/or remote class in the US and across the world. The focus of the present work is thus on learner attitudes about technology as a part of the whole classroom experience, rather than on the implementation of a specific technological tool or task.

Review of the literature

Attitudes about CALL and attitudes about language learning

Positive learner attitudes about language learning have long been connected to the use of technology in the language classroom. Studies have offered evidence that positive attitudes about the use of specific technological tools correlate with positive attitudes or added motivation and interest about language learning or a specific language task (e.g., T.-Y. Liu & Chu, 2010 [ubiquitous gaming]; Mavrou *et al.*, 2010 [cloze-text and writing composition]; Y.-C. Wang, 2015 [wikis]). For instance, the study by T.-Y. Liu and Chu (2010) investigated Chinese high school English learners and their use of ubiquitous gaming technologies. In the experimental group where ubiquitous games were integrated into the learning processes, the learners demonstrated significantly more learning motivation in relation to attention, relevance, confidence, and satisfaction than in the control group. A correlation between positive attitudes about technological tools and positive learner attitudes about language learning has not been found in all circumstances, however. For example, Chen's (2016) experimental study on blogging in a university English as a Foreign Language (EFL) language classroom in Taiwan found no differences in writing motivation or anxiety for the learner participants in the experimental (blogging) and control (no blogging) groups (see also C.-C. Liu *et al.* (2016) for an examination of changes in attitude over time).

Very few studies have looked at learner attitudes about CALL as an integral, regular, consistent component of the learning process in the language classroom, and then correlated those attitudes with attitudes about language learning and/or the language class. Two of the only published research studies on this topic were conducted with university EFL learners in Turkey (Öz, 2015; Öz *et al.*, 2015). In these studies, the researchers found that, among these learners, there were statistically strong positive correlations between the Using the Attitudes towards Foreign Language Learning (A-FLL) Scale and the Attitudes towards Computer-Assisted Language Learning (A-CALL) Scale.

Ultimately, the research on the relationship between learner attitudes about CALL and attitudes about language learning and/or the language class has shown a primarily positive relationship. Some studies have suggested that the relationship between attitudes about technological tools and attitudes about language learning is more complex, insofar as it is mediated by how the tool is implemented, the learner's own learning trajectory, and the training provided to the learner (e.g., Elola & Oskoz, 2010; Gikas & Grant, 2015; Li, 2018). The



few studies about general learner attitudes about CALL and attitudes about language learning by Öz (2015) and Öz *et al.* (2015) detailed above, have more universally shown a positive relationship between the two types of attitudes.

Importantly, none of these studies have been conducted in secondary WL learning contexts in the United States. Although secondary WL learners in the US do share some characteristics with university learners and learners in other countries, research has shown repeatedly that learner cognition about language learning differs across contexts and age groups (Horwitz, 1988). Furthermore, the specific ways that learners use technology in the classroom and the practices used by teachers in integrating technologies also differ widely across contexts and from year to year as technologies change through advancements. For instance, in the United States, 1:1 initiatives where every learner is given the same school-regulated device (e.g., a laptop or tablet) are common at the secondary level, but uncommon in most other contexts (Lowther *et al.*, 2003; Zheng *et al.*, 2013). Therefore, we must be cautious about overgeneralizing findings about learner attitudes about CALL in the language classroom across disparate learning institutions and educational systems, as well as over time (Chambers & Bax, 2006; Sydorenko *et al.*, 2017). This study addresses this gap in the literature by focusing on WL education at the secondary level in the United States.

Technology prevalence, CALL attitudes, and language learning attitudes

Research conducted across different national and international general educational contexts has consistently found a significant positive relationship between the prevalence of computer usage in schools and a variety of positive attitudinal measures in learners. Zhong (2011), with data from 16 countries, found a positive relationship between the use of technology in school and learners' self-reported digital skills. Hatlevik *et al.* (2018), with data from 15 countries on the International Computer and Information Literacy Study 2013, found that experiences with technology led to more self-efficacy relating to technology. Studies on secondary learners set in Switzerland (Schmid & Petko, 2019) and Israel (Levine & Donitsa-Schmidt, 1997) also found positive correlations between the increased use of technology and learners' attitudes relating to technology. In the United States, Gibson *et al.* (2014) conducted a study with an intervention designed to incorporate increasing amounts of technology in US elementary schools. The authors trained fourth- and fifth-grade general education teachers to use more technology in their classrooms over the course of four years, dividing the teachers into three groups based on their computer use. In comparing those groups, the authors found clear evidence of "a significant and positive relationship between intervention intensity and changes in student attitudes toward computing" (2014, p. 170). Similarly, in a study by Lowther *et al.* (2003) looking at a population of fifth-, sixth-, and seventh-grade learners in the United States, a matched treatment-control group design contrasted schools where each learner was given a laptop in schools where there were only about five computers per class. They found that the increased

presence of technology correlated with better attitudes about technology, even when other components of the classroom did not change (Lowther *et al.*, 2003).

Very few studies have been conducted specifically about the prevalence of technology and its correlation with learner attitudes in secondary language learning environments. Measures of the prevalence of learners' use of technology at the post-secondary level has often been directed beyond the classroom, such as on the learners' use of computers or social media in their everyday lives (see for instance MacLean & Elwood, 2009). Some parallel findings to the studies about general education classrooms previously discussed have been identified, for instance, Öz *et al.*, (2015), in their study of university EFL learners in Turkey, determined that more frequent computer use for language learning purposes correlated with better attitudes about CALL. Sydorenko *et al.* (2017), working in a WL program in a US university, similarly examined how learner beliefs about CALL were related to how much technology they used in-class and out-of-class. They found that more in-class technology use correlated with more positive beliefs about CALL. In their case, learners who used technology for more than one hour a week in the classroom showed more positive beliefs about CALL than learners who used technology for less than one hour.

This is an area that certainly merits more study. As with the research on learner attitudes about CALL and about language learning, there is a lack of relevant research about technology prevalence, CALL attitudes, and language learning attitudes in the secondary WL context in the United States.

The present study

To fill the gaps identified in the research literature, this study will examine several different ways in which secondary learner attitudes interrelate with the use of CALL within the environment of the WL classroom. The research questions for this study are the following:

1. How do US secondary WL learner attitudes about the use of technology in their language class relate to their attitudes and self-confidence about their language class?
2. How does the prevalence of computer usage in a US secondary WL class relate to (a) learner attitudes about their language class, (b) learner self-confidence about their language class, and (c) learner attitudes about the use of technology in the language class?

Method

This study is a correlational quantitative study designed to identify relationships among variables but not to establish causality *per se* (Phakiti, 2015). The primary source of data in the study is an 81-item online survey administered to secondary WL learners in the United States.

Participants and setting

Participants in this study were recruited through contacting K-12 public school districts across one Midwestern state in the United States. Public school districts in the United States are designated to serve a specific geographic area through offering cost-free instruction to all students from kindergarten (“K,” approximately age 5) through the end of secondary school (grade “12,” approximately age 18). School districts vary widely in size, with small rural districts sometimes consisting of one school building that includes all classrooms for teachers and students K-12, while large urban districts will include multiple elementary (grades K–5/6), junior high (grades 6/7–8), and high schools (grades 9–12). Public school districts are governed by a superintendent appointed by an elected body (the “school board”) as well as principals and assistant administrators assigned to each school.

Table 1. Participant demographics (N = 1031)

Category	Subcategory	Percentage
Gender	Male	42
	Female	57
	No response	1
Level	Junior high school	4
	High school level 1	36
	High school level 2	28
	High school level 3	19
	High school level 4/5	11
	Other/no response	2
Language	Spanish	85
	German	13
	French	2
City type*	Urbanized area	8
	Urban cluster	64
	Rural	24
	No response	4

*Urbanized Areas have a population that is greater than 50,000; urban cluster population is between 2,500 and 50,000, and rural city types include all other areas.

Thirty-seven public school districts in the state (about 10% of total districts) consented to participate in the study. After consent was given at the district level, the survey was sent to the district’s WL teachers who distributed the survey to their students. The participant makeup is summarized in Table 1. The participants in this study (N = 1031) included 42% male and 57% female learners (1% non-response). Languages represented were 85% Spanish, 13% German, and 2% French. Most of the participants were in Level 1 (36%) and Level 2 (28%) high school classes, with Level 3 (19%) and Level 4/5 (11%) represented as well. Only 4% of the respondents were in junior high (2% non-responses).



Additionally, there was considerable representation from rural contexts (population less than 2,500; 24% of participants), as well as from urbanized clusters (population between 2,500 and 50,000; 64%). Large urban districts were not as widely represented in the study (population greater than 50,000; 8%), primarily due to the demographic composition of the predominantly rural state (4% non-response). Because this group of respondents was obtained by districts, teachers, and students choosing to participate, any generalizations from the data should be considered with care.

Instrument

The survey used in the present study (see Appendix A) was developed with the use of both qualitative and quantitative data. The qualitative data consisted of interviews with eight secondary Spanish learners from four different and demographically diverse sites within the state. Questions in the interviews (see Appendix B) encouraged the learners' reflections on their attitudes about technology and the language class. These qualitative data were collected in order to offer context-specific information about participant technology usage so as to produce an instrument that was "optimally reliable and valid" (Onwuegbuzie *et al.*, 2010, p. 63). This step was necessary since all other instruments in the field had been created for post-secondary learners outside of the United States. The quantitative data consisted of a pilot survey administered online via Qualtrics, adapted from MacLean and Elwood (2009) and Guilloteaux and Dörnyei (2008), sent to secondary learners in the state (N = 268). These two data sources were then combined to create the 81-item survey used in the present study, comprised of ten sections (Table 2). The 81-item online survey was also administered using Qualtrics. This paper will present the results from the following sections (bolded in Table 2): Attitudes about Language Class, Self-Confidence about Language Class, Attitudes about Technology in the Language Classroom, as well as one question from the Demographics section.

Table 2. Sections of the survey instrument

Section	# items
Technological Proficiency in Common Tasks	10
Usefulness of Technology for School Topics	5
How the Respondent will use Technology in the Future	3
Preferences for Using Technology	12
Setting for Learning Technology	3
How Respondent has Helped Others with Technology	4
Attitudes about Language Class	7
Self-Confidence about Language Class	7
Attitudes about Technology in the Language Classroom	13
Demographics	17 (1*)

*One question from the Demographics section is analyzed in the present study.



The Attitudes about Language Class section was adapted from a survey featured in Guilloteaux and Dörnyei (2008). The seven positively-worded Likert-type items had been shown in the pilot study to be a valid measure of the construct for the population under study. Some examples of these items include “I wish we had more [language] classes at school this year” and “When [language] class ends, I often wish it would continue.” In the survey, the text “[language]” was automatically replaced via the survey software with the language the learner self-identified as the primary language they were currently studying (e.g., Spanish, French, German). The measure of internal consistency of this section in the current study’s data, the Cronbach’s Alpha, was .905, which is seen as a strong result.

The Self-Confidence about the Language Class section was similarly adapted from Guilloteaux and Dörnyei’s (2008) work and shown to be valid in the pilot study, previously referenced, for this population. All seven positively-worded Likert-type items were used in the analysis. Examples include: “I feel I am making progress in [language] this year,” and “I am sure that I will one day be able to speak [language].” The Cronbach’s Alpha for this section in the current study’s data was also .905.

The third section, Attitudes about Technology in the Language Classroom, was developed based on the qualitative data gathered during the survey development process. Four major attitudes could be identified in the qualitative data: technology as effective and efficient in the language class; technology as allowing learners more autonomy in the language class; a personal liking of using technology to learn language; and self-efficacy about technology in the language class. The term “technology” was selected for use in the survey over the word “CALL,” which has been used in similar instruments, notably the A-CALL scale (Öz, 2015; Öz *et al.*, 2015). The researchers determined from the interview data that the term “technology” was more familiar to the population under study, and it was sufficiently equivalent for the purposes of the survey and aligned more with the purposes of the study to look at technology as a regular and integrated part of the classroom. These themes were then transformed into 13 Likert-style items where learners had to mark their level of agreement with statements like, “I like doing new things with technology in [language] class,” and “Using technology in my [language] class helps make less work for the students.” Ultimately, this section of 13 items proved to be internally consistent, with a Cronbach’s Alpha of .898.

This study also addresses learners’ responses to one question in the Demographics section. This question was phrased as “How often do you access computers in your [language] classroom?” The participants were given seven possible responses to this question: (a) daily or almost daily; (b) 2–3 times a week; (c) once a week; (d) 2–3 times a month; (e) once a month; (f) a few times a year; and (g) never. This item thus served as the basis for the analysis of the relationship between the prevalence of computer usage in the language classroom and learner attitudes. This item was selected for analysis in this study due to the changing prevalence of technology at the secondary level in the United States, and to examine if the prevalence of technology use with this population

was as impactful on learner attitudes as it is in other contexts. Just as with the previous use of the word “technology,” the use of “computers in your [language] classroom” was seen to be the most accessible and applicable to the learners in the study based on the piloting of the initial survey and the qualitative data.

Data analysis

We used the statistical software SPSS for all calculations. In order to determine the association of learner attitudes about technology in the language classroom with their attitudes and self-confidence about language class (RQ1), we first converted the Likert-type items in each section to a score. For each item, we entered -2 for a “strongly disagree” response, -1 for a “disagree” response, 0 for a “neither agree nor disagree” response, 1 for an “agree” response, and 2 for a “strongly agree” response. We added up each participant’s individual item scores for each section, to result in one total score for each section for each participant, creating what Turner has called “interval-like data” (1993, p. 738). In order to measure the internal consistency, Cronbach’s Alpha for each section was calculated, as reported above. Finally, we calculated the correlations (using the Pearson Correlation Coefficient) between (1) the Attitudes about Technology in the Language Classroom scores and the Attitudes about Language Class scores and (2) the Attitudes about Technology in the Language Classroom scores and the Self-Confidence in Language Class scores.

In order to examine the relationship between the prevalence of computer usage in the WL class and the learner attitudes about language class, their self-confidence about language class, and their attitudes about technology in the language classroom (RQ2), we started with the three section calculations used for RQ1. For the prevalence question (“How often do you access computers in your [language] classroom?”) we grouped the responses to provide a large enough sample to support our statistical procedures. Learners who responded (a) daily or almost daily or (b) 2–3 times a week were grouped into a “high usage” group (N = 513). Learners who responded (c) once a week; (d) 2–3 times a month; or (e) once a month were grouped into a “medium usage” group (N = 379). Learners who responded (f) a few times a year or (g) never were grouped into a “low usage” group (N = 140). We then ran ANOVA tests with the Tukey post hoc test for each relationship between the prevalence (independent variable) and the Learner Attitudes about Technology in the Language Classroom, Attitudes about Language Class, and Self-Confidence about Language Class (dependent variables).

Results

Attitudes about technology in the language classroom and attitudes and self-confidence about language class

Table 3. Correlation with attitudes about technology in the language classroom

Subscale	Pearson Correlation	
	Coefficient	Sig. (2-tailed)
Attitudes about Language Class	.556	.000**
Self-Confidence about Language Class	.561	.000**

** Correlation is significant at the .01 level (2-tailed)

As shown in Table 3, the analyses revealed significant correlations between the Attitudes about Technology in the Language Classroom and the Attitudes about Language Class responses. They also revealed significant correlations between the Attitudes about Technology in the Language Classroom and the Self-Confidence About the Language Class sections.

Computer prevalence and attitudes about language class

Table 4. One-way analysis of variance of attitudes about language class by computer usage

	Sum of squares	df	Mean square	F	p
Between groups	347.843	2	173.922	4.790	.008**
Within groups	37363.481	1029	36.310		
Total	37711.325	1031			

**p value: Significant at the $p < .01$ level

A one-way ANOVA was conducted to compare the high-usage, medium-usage, and low-usage groups on computer prevalence and attitudes about language class. There was a statistically significant difference among the three groups ($F(2, 1029) = 4.790, p = .008$) (Table 4). A Tukey post hoc test revealed that the scores on the survey in the Attitudes about Language Class section were significantly higher for learners who stated that they had high ($p = .03$) or medium ($p = .006$) usage of computers in their classroom compared with those who reported low usage. There was no significant difference between learners who reported high and medium usage.



Computer prevalence and self-confidence about language class



Table 5. One-way analysis of variance of self-confidence about language class by computer usage

	Sum of squares	df	Mean square	F	p
Between groups	522.059	2	261.029	7.399	.001**
Within groups	36300.328	1029	35.277		
Total	36822.387	1031			

**p value: Significant at the $p < .01$ level

A one-way ANOVA was conducted to compare the high-usage, medium-usage, and low-usage groups on computer prevalence and self-confidence about language class. There was a statistically significant difference among the three groups ($F(2, 1029) = 7.399, p = .001$) (Table 5). A Tukey post hoc test revealed that the scores on the survey in the Self-Confidence about Language Class section were significantly higher for learners who stated that they had high ($p = .003$) or medium ($p = .000$) usage of computers in their classroom compared with those who reported low usage. There was no significant difference between learners who reported high and medium usage.

Computer prevalence and attitudes about technology in the language classroom

Table 6. One-way analysis of variance of attitudes about technology in the language classroom by computer usage

	Sum of squares	df	Mean square	F	p
Between groups	3086.618	2	1543.309	20.533	.000**
Within groups	77340.359	1029	75.161		
Total	80426.977	1031			

**p value: Significant at the $p < .01$ level

A one-way ANOVA was conducted to compare the high-usage, medium-usage, and low-usage groups on computer prevalence and learner attitudes about technology in the language classroom. There was a statistically significant difference among the three groups ($F(2, 1029) = 20.533, p = .000$) (Table 6). A Tukey post hoc test revealed that the scores on the survey in the Attitudes about Technology in the Language Classroom section were significantly higher for learners who stated that they had high usage compared with those with medium ($p = .042$) or low ($p = .000$) usage of computers in their language classroom. Furthermore, the learners reporting medium usage ($p = .000$) had significantly higher scores on the survey than those reporting low usage.

Discussion

The relationship between attitudes about technology in the language classroom and attitudes and self-confidence about language class

This study found that learner attitudes about technology in the language classroom had a significant positive correlation with their attitudes about language class. Additionally, learner attitudes about the use of technology in the language classroom had a significant positive correlation with their self-confidence about language class.

These findings make specific contributions to the field in two important ways. Most notably, as indicated above, this study echoes the findings in other contexts and at other levels, offering important evidence that a relationship exists for learners in the secondary level in the US between attitudes about technology in the language classroom and attitudes and self-confidence about language class (Öz, 2015; Öz *et al.*, 2015; Sydorenko *et al.*, 2017). These findings are important given the differences between secondary and post-secondary institutions in terms of technological capabilities and implementation patterns (Lowther *et al.*, 2003; Zheng *et al.*, 2013), learner cognition about language learning (Horwitz, 1988), institutional structures (Chambers & Bax, 2006), teacher qualifications and backgrounds, and learner training in using technology (Sydorenko *et al.*, 2017) to name a few. In addition to addressing a broader and more academically and socioeconomically diverse group of WL learners than most other studies on this topic, this study offers a new perspective of the importance and enriching possibilities of CALL usage in the classroom.

Secondly, this study measured learners' general attitudes about technology in their language classes, not focusing on one particular tool or experience using technology. In seeking to avoid the technocentrism identified by scholars like Chapelle (2001) and S. Wang and Vásquez (2012), and identifiable in many CALL studies (e.g., Castañeda, 2013; Elola & Oskoz, 2010; Li, 2018; T.-Y. Liu & Chu, 2010; C.-C. Liu *et al.*, 2016; Y.-C. Wang, 2015; Zhonggen *et al.*, 2019), this study contextualizes attitudes about technology within the learners' broad experiences in the secondary WL classroom, the "learning environment and experience" identified by Kessler (2018, p. 208; see also Chambers & Bax, 2006; Stockwell & Reinders, 2019). This measure of learners' attitudes about technology in the language classroom was based on a process of instrument development that began with qualitative interviews with secondary WL learners in the United States. As such, the data generated were designed to reflect actual patterns and themes of CALL in the context being studied. This increased the internal validity of the measure as an accurate look at the breadth of the experience of the secondary WL learner in the US in modern times (Onwuegbuzie *et al.*, 2010).



Computer prevalence

In the case of learner attitudes about the use of technology in the language classroom, there were significant differences between all three groups – high, medium, and low computer usage. Learners with low technology usage displayed significantly fewer positive attitudes and lower self-confidence about language class, and fewer positive attitudes about the use of technology in the language classroom than learners with medium or high usage. This finding echoed work conducted across national and international contexts outside of language education, where consistently positive relationships between the increased use of technology in schools and positive attitudinal measures have been found in many important studies (Gibson *et al.*, 2014; Hatlevik *et al.*, 2018; Levine & Donitsa-Schmidt, 1997; Lowther *et al.*, 2003; Schmid & Petko, 2019; Zhong, 2011).

Importantly, three different categories of computer prevalence were included in the analysis. This examination of three categories of prevalence allowed us to observe a more fine-grained distinction in the data, particularly when looking at learner attitudes and self-confidence about language class. Most notably, we found that learners in contexts with a medium and high computer usage in WL class responded similarly enough to questions about their attitudes and self-confidence about language class that there was no significant statistical difference between the groups on those sections. This finding suggests that, as long as there is some regular computer usage in WL classes, even if it is as infrequently as once a week, two to three times a month, or even once a month, there is a correlation with more positive attitudes and self-confidence about language class, again echoing the findings in other contexts in the work by Öz (2015), Öz *et al.* (2015), and Sydorenko *et al.* (2017). This finding provides a basis for what might potentially be a more manageable goal when considering initial and sustained implementation of computers in WL classes in order to improve attitudes and self-confidence in relation to language class.

The one area where the medium and high usage groups significantly differed was in the learner attitudes about the use of technology in the language classroom. In that case, the learners who reported high computer usage demonstrated significantly more positive attitudes about technology use in the language classroom than the medium group. One possible explanation for this finding lies in the fact that WL classrooms in which computers were used every day or almost every day (high usage group) would likely have been integrating a wide variety of CALL activities in the classroom. Learners in these classrooms would have more experience with and be better able to navigate computers and multiple technological tools (Hubbard, 2013). In such classes, CALL would be more normalized due to its regular use, potentially (although not certainly) making it more engaging. Classrooms in which computers were used once a week to once a month (medium usage group) would likely have been more focused on isolated CALL activities during that usage. It is possible that, despite the wording on the survey, the learners in the medium usage group were reflecting on one specific technological tool rather than a more global consideration of CALL in the classroom. This interpretation of the data



mirrors the suggestion by scholars that the field needs to shift from a focus on individual technological tools to a normalized use of technology in teaching practice (Chambers & Bax, 2006) and the learning environment (Kessler, 2018). This significant difference in attitudes between the high-usage learners and the medium-usage learners might suggest that a more normalized, regular use of technology rather than a focus on isolated tools or infrequent technology-focused projects results in better learner attitudes. More targeted investigation of this question is certainly warranted.

Limitations and suggestions for future research

This study was based in a one-shot self-report measure of learner attitudes. This design does not account for possible variation in attitudes that might occur, for example, over time, or in response to specific CALL activities or tools (C.-C. Liu *et al.*, 2016). However, this design does allow this study to be in conversation with other similar studies. Future research might measure secondary WL learner attitudes multiple times during their schooling experience, tracing the fluctuations in their attitudes as they experience different WL classes with different types and amounts of CALL activities. Another limitation relates to the lack of ability to control what might be very important variables in this study. Some variables to consider might include learner attitudes about school, technology usage in other subjects at school, the nature of their language instruction and of the patterns of technology usage in their class, their socioeconomic status, or their out-of-school access to technology. Although the goal of this study was to trace broad trends in an understudied population, other types of differences within that population certainly merit investigation as well in order to hone our understanding of the phenomena in question. The issue of how learners access technology and how that overlaps with their socioeconomic status is a particularly important one as further investigation into learner attitudes about CALL develops (see Vekiri, 2010). Finally, the changes in technology usage in the secondary WL classroom have shifted dramatically in 2020 due to COVID-19, and those effects will be felt in many unpredictable ways in the future. Many studies about learner attitudes about technology and language learning will need to be revisited in light of these societal changes.

Conclusion

This study contributes to a shift in CALL research to a broad consideration of CALL as an integral, regular, consistent component of the language learning process (Chambers & Bax, 2006; Chapelle, 2001; Kessler, 2018; Stockwell & Reinders, 2019; Sydorenko *et al.*, 2017; S. Wang & Vásquez, 2012; Warschauer, 2002). The study presents evidence that the secondary WL learners in the US experience technology and language learning as a unified whole in the language classroom, and that they often have similar attitudes about both. In cases where computers were not used as frequently in the classroom, learner attitudes were less positive about technology and about the WL class, and they

reported lower self-confidence about their WL class. As learner attitudes are shown in this study to be related to the overall prevalence of computers in the classroom, then future research should take prevalence into account even when looking at specific technological tools.

Furthermore, in using a measure with items that reflect the specific CALL practices and the learning context of US secondary WL learners, this study responds to the need for context-specific studies of learners and CALL (Chambers & Bax, 2006; Sydorenko *et al.*, 2017). The first implication for practice is that the inclusion of more CALL in the WL classroom relates to improved learner attitudes and self-confidence in language class. This finding echoes Sydorenko *et al.*'s (2019) finding about learner beliefs at the post-secondary level in the US; like them, we recommend that teachers can enhance the strength of this relationship through more discussion with learners about the benefits of CALL in language learning. A second implication is that language teacher educators can use these findings as justification and context for enhanced training in technology integration in the WL classroom. CALL can be positioned not just as a vital component of the language learning process, but also as a way for teacher candidates to cultivate positive learner attitudes in the WL classroom. Finally, this study invites us to consider the effectiveness of the specific CALL learning opportunities being developed and provided. As online learning, hybrid, and blended learning models, and 1:1 initiatives become more common at all levels, WL teachers need to be included in school and district conversations about effective practice using technology, so that they can best leverage the attitudinal benefits associated with CALL to enhance learning outcomes. Ultimately, this study hopes to provide a new step forward in the improvement of language education at all levels and in all contexts.

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Appendix A

Student technology questionnaire

Thank you for accessing this questionnaire about technology and language learning. It should only take about ten minutes to complete. Please finish the entire questionnaire, and be honest. You will not have to enter your name at any time, and we have no way of detecting who you are.

Throughout this questionnaire, whenever there is a reference to ‘computer’ this includes: a desktop computer, a laptop computer, and/or a tablet computer (e.g., iPad).

If you have any questions about this survey, please contact Dr. Pamela Wesely at the University of Iowa. Her email address is pamela-wesely@uiowa.edu, and her phone number is 319-335-XXXX. Thank you very much for your help and your responses!

By continuing, you confirm that you are currently enrolled in a middle school, junior high school, or high school foreign language course (e.g., Spanish, French, Chinese, etc.).



A. How well can you do the following activities? Select one response for each activity.

(1 = Not at all, 2 = A little, 3 = Enough so I have no problems, 4 = Well, 5 = Extremely well)

1. Touch-typing	1	2	3	4	5
2. Browsing the internet using a cell phone	1	2	3	4	5
3. Browsing the internet using a computer	1	2	3	4	5
4. Email using a cell phone	1	2	3	4	5
5. Email using a computer	1	2	3	4	5
6. Writing a paper on a computer (e.g., Microsoft Word)	1	2	3	4	5
7. Creating a spreadsheet on a computer (e.g., Microsoft Excel)	1	2	3	4	5
8. Downloading movies and music	1	2	3	4	5
9. Downloading new software (including apps)	1	2	3	4	5
10. Connecting peripheral devices (speakers, printer, etc.)	1	2	3	4	5

B. How useful is technology like cell phones and computers for learning the following subjects? Select one response for each activity.

(1 = Not at all, 2 = A little, 3 = Somewhat useful, 4 = Quite useful, 5 = Extremely useful)

11. Learning math	1	2	3	4	5
12. Learning science	1	2	3	4	5
13. Learning history or social studies	1	2	3	4	5
14. Learning English	1	2	3	4	5
15. Learning a second language	1	2	3	4	5

C. After high school, how much do you think you will use technology for the following?

Select one response for each item.

(1 = Not at all, 2 = Occasionally, 3 = Sometimes, 4 = Frequently, 5 = Almost always)

16. For private use (e.g., browsing, shopping on the internet)	1	2	3	4	5
17. For work	1	2	3	4	5
18. For study	1	2	3	4	5

D. How much do you like doing the following class activities that use technology? Select one response for each activity.

(1 = Strongly dislike, 2 = Dislike, 3 = Neither like nor dislike, 4 = Like, 5 = Strongly like, 6 = Never done this)

19. Looking at readings my teacher has posted	1	2	3	4	5	6
20. Doing a presentation with software (e.g., PowerPoint, Prezi)	1	2	3	4	5	6
21. Taking a quiz or test	1	2	3	4	5	6
22. Posting on social network sites (e.g., Twitter, Pinterest, etc.)	1	2	3	4	5	6
23. Looking at videos or other media my teacher has posted	1	2	3	4	5	6
24. Doing a drill or practice	1	2	3	4	5	6
25. Creating and/or editing collaboratively (e.g., Google docs, wiki)	1	2	3	4	5	6

26. Writing a 5-page paper	1	2	3	4	5	6
27. Playing an academic game	1	2	3	4	5	6
28. Writing and/or commenting on a blog	1	2	3	4	5	6
29. Creating videos for projects	1	2	3	4	5	6
30. Researching on the internet	1	2	3	4	5	6

E. How much have you learned about technology from the following? Select one response for each item.

(1 = Not at all, 2 = Occasionally, 3 = Sometimes, 4 = Frequently, 5 = Most of my learning)

31. School	1	2	3	4	5
32. Friends	1	2	3	4	5
33. On your own	1	2	3	4	5

F. Please indicate the extent to which you do or have done the following activities. Select one response for each item.

(1 = Not at all, 2 = Occasionally, 3 = Sometimes, 4 = Frequently, 5 = Almost always)

34. Helping family with technology.	1	2	3	4	5
35. Helping friends with technology.	1	2	3	4	5
36. Helping classmates with technology.	1	2	3	4	5
37. Using educational software for learning languages. (e.g., Rosetta Stone, Pimsleur, Mango)	1	2	3	4	5

38. What foreign language class are you currently enrolled in?

(Arabic, Chinese, French, German, Italian, Japanese, Korean, Latin, Portuguese, Russian, Spanish)

G. Please indicate how much the following sentences are true for you. Select one response for each item.

(1 = Strongly disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Strongly agree)

38. I wish we had more [language] classes at school this year.	1	2	3	4	5
39. I like [language] class this semester.	1	2	3	4	5
40. [Language] is one of my favorite subjects at school this year.	1	2	3	4	5
41. When [language] class ends, I often wish it would continue.	1	2	3	4	5
42. I want to work hard in [language] class to make my teacher happy.	1	2	3	4	5
43. I enjoy my [language] class this year because what we do is neither too hard nor too easy.	1	2	3	4	5
44. In [language] class this year, we are learning things that will be useful in the future.	1	2	3	4	5
45. I feel I am making progress in [language] this year.	1	2	3	4	5
46. I believe I will receive good grades in [language] this year.	1	2	3	4	5

47. I often experience a feeling of success in my [language] class this year.	1	2	3	4	5
48. I am sure that one day I will be able to speak [language].	1	2	3	4	5
49. In [language] class this year, I usually understand what to do and how to do it.	1	2	3	4	5
50. This year, I think I am good at learning [language].	1	2	3	4	5
51. I often volunteer to do speaking presentations in [language] class.	1	2	3	4	5

H. Please indicate how much the following sentences are true for you. Select one response per item.

(1 = Strongly disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Strongly agree)

53. Using technology in my [language] class helps make less work for students.	1	2	3	4	5
54. I like emailing or texting my teacher in [language].	1	2	3	4	5
55. My teacher can trust me to pick ways to use technology to help me learn [language].	1	2	3	4	5
56. When we use technology in my [language] class I feel like I learn more.	1	2	3	4	5
57. I am able to manage technology distractions in my [language] class.	1	2	3	4	5
58. I spend personal time using technology to help me improve my [language].	1	2	3	4	5
59. I always use technology the way my [language] teacher wants me to in class.	1	2	3	4	5
60. We don't have technology break-downs in my [language] class.	1	2	3	4	5
61. I enjoy it when my teacher incorporates technology into my [language] class.	1	2	3	4	5
62. I like it when my teacher gives me choices of different technology to use in [language].	1	2	3	4	5
63. I feel like we use the right amount of technology in [language] class.	1	2	3	4	5
64. I know how to find technology resources to help me learn [language].	1	2	3	4	5

I. Background information. Please answer the following questions.

65. Gender: (male/female)

66. Year in School: (5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th)

67. What level of foreign language class are you currently in? (middle school first year, middle school second/third/fourth year, high school level 1, high school level 2, high school level 3, high school level 4, high school level 5/AP)



68. List any other languages that you are currently or have previously studied (other than [language]): _____
69. Name of the current school you are attending: _____
70. Name of your school district (if you don't know, leave it blank): _____
71. How do you access technology at your school? (check all that apply): (computer lab/computers in my classroom/laptop or tablet cart/one-to-one)
72. How do you access technology in your language classroom? (check all that apply) (computer lab/computers in classroom/laptop or tablet cart/one-to-one)
73. At your current school, where is there internet access? (check all that apply) (all the classrooms/most of the classrooms/common areas(e.g., main office or library)
74. How often do you access the internet at school? (daily/weekly/Once a week/2-3 times a month/once a month/once or twice a year/never)
75. How often do you access the internet in your [language] classroom? (daily/weekly/Once a week/2-3 times a month/once a month/once or twice a year/never)
76. Do you have internet access at home? (yes/no)
77. Do you have access to a personal computer at home (e.g., laptop, desktop computer and/or tablet)? (yes/no)
78. Do you have regular access to the internet from a smart phone? (yes/no)
79. Approximately how many hours per week do you think you spend on a computer? _____
80. Approximately how many of those hours per week are spent doing personal (not school related) things on the computer? _____
81. Do you use any of the following social media sites outside of school activities? (check all that apply) (Facebook/Twitter/Instagram/Pinterest/Google+/YouTube/FoureSquare/SnapChat/Blog/Other)

Appendix B

Student interview protocol

I just want to start by talking generally about languages and language learning.

- ▶ What's your main reason for learning Spanish?
- ▶ Talk to me about Spanish. Do think that it's good to know it? Why or why not?
- ▶ Talk to me about Spanish -speaking people that you know. What are they like?
- ▶ What about other languages? Have you ever thought about learning another language? What and why?

Let's talk about your Spanish class. Can you describe it to me? What are some things that you do a lot in that class?

- ▶ What are some of your favorite activities in that class?
- ▶ What are some of your least favorite activities?
- ▶ What do you think helps you learn the most in that class?
- ▶ Can you compare yourself to other students in the class? Do you feel that you are good at Spanish?



Talk to me (more) about what you do with technology in the class. Explain to me a few activities that you do that use computers or the Internet.

- ▶ I'm really interested in social media and how people learn together using computers and the Web. Do you do this in your class? How? What do you do?
- ▶ Again, can you compare yourself to other students – how comfortable with technology are you in comparison to other students in the class?

I want to talk about how you use technology outside of class. Do you access the Internet outside of school? How?

- ▶ You don't have to tell me a lot of details, but can you give me some information about how you use social media outside of school? Do you use Facebook, Twitter, or blogs? I promise I won't look you up.

Now you're at the end of the year. What do you think that you learned about Spanish? What did you learn about technology?

Is there anything else that you'd like to add that you think would help me to understand more about what you think about your language class and technology?