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Article

Foreign Language Learners' Beliefs about CALL: The Case of a U.S. Midwestern University

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Abstract

A significant body of research has examined language learners' attitudes toward particular technologies used in foreign language classrooms. However, literature is scarce on foreign language learners' beliefs toward computer-assisted language learning (CALL) in general. To narrow this gap, we investigated the constructs that compose a system of language learners' beliefs toward CALL at a large U.S. university and examined whether the amount of technology used and the target language (TL) play a role in shaping learners' beliefs. The findings of this large-scale survey of 2,061 students studying nineteen different TLs indicate four factors comprising learners' belief systems toward CALL in this context: efficacy of technology for language learning and its connection to motivation, satisfaction with technology used in the learners' classes, specific benefits of technology, and the importance of computer skills and technical support. Learners' CALL beliefs were more positive when they had had more exposure to technology in their classes, but this varied based on the TL. Higher use of technology outside of class resulted in more positive beliefs across the board, independent of the TL. The pedagogical implications are that greater exposure to effective and varied models of CALL might result in more positive beliefs toward it.

KEYWORDS: FOREIGN LANGUAGE LEARNER BELIEFS ABOUT CALL; LARGE-SCALE SURVEY; PRINCIPAL COMPONENT ANALYSIS

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The use of technology in language teaching has been steadily rising since the 1960s (van Compernolle & Williams, 2009) partly due to its pedagogical benefits, which seem to make computer-assisted language learning (CALL) at least as effective as traditional instruction (e.g., Blake, Wilson, Cetto, & Pardo-Ballester, 2008; Chapelle, 2010; Murday, Ushida, & Chenoweth, 2008; Scida & Saury, 2006).

Realizing these pedagogical potentials, however, depends on a complex interplay between context and stakeholders. One important factor in this interplay is the beliefs of both learners and instructors. As "the lynchpin around which successful online learning events revolve" (Guichon & Hauck, 2011, p. 188), instructors shape if and how technology gets implemented (Arnold & Ducate, 2015) and in that process are influenced by what they know and believe (Borg, 2003). In addition to general beliefs about the value of technology integration, which have been shown to be favorable for foreign language (FL) teachers (Bell, 2005), teachers' level of computer use is influenced by their self-efficacy beliefs (Wang, Ertmer, & Newby, 2004).

Beliefs also play an important motivating role for language learners (Dörnyei, 2005; Kalaja & Barcelos, 2003), who may not even benefit from technology if they do not believe that technological tools are helpful. Research shows that learners' beliefs correlate with motivation (Mori, 1999), and misconceptions about language learning can be detrimental to the outcomes (e.g., Cohen & Dörnyei, 2002). While there have been systematic analyses of learners' belief systems toward language learning in general (e.g., Diab, 2006; Horwitz, 1988), as well as specific aspects of language learning, like grammar instruction (e.g., Loewen et al., 2009; Schulz, 1996), systematic examinations of learners' belief systems toward CALL are scarce. Instead, the majority of studies have investigated learners' attitudes toward specific technologies. Therefore, the present study addresses this need for research on learner beliefs toward CALL.

Literature Review

This literature review focuses on learner beliefs toward CALL and the related construct of learner attitudes. Beliefs have been defined in a number of ways, but there is general agreement that they are "propositions individuals consider to be true and which are often tacit, have a strong evaluative and affective component, [and] provide a basis for action" (Borg, 2011, pp. 370f.). Influenced by context (e.g., Lai, 2013; Stockwell, 2013; see Wesely, 2012 for a review) and mediated by a variety of factors such as the person's background and learning experience (Stockwell, 2013), learner beliefs can have a profound albeit not necessarily direct impact on a learner's response to a learning situation (Barcelos & Kalaja, 2011). Attitudes, in contrast, are often conceptualized as less overarching and more specific to a particular situation than beliefs (Wesely, 2012).

Learner Beliefs about CALL

Research has begun to describe learner beliefs about CALL and identify factors that influence them. Surveying 218 FL learners in Canada and Great Britain, Barr (2004) found that while most learners used technology extensively in daily life, many were not aware of the language learning benefits technology can offer. Two more recent large-scale studies by Lai and Gu (2011) and Lai (2013) examined learners' overall belief systems with regard to CALL. Focusing specifically on the self-regulated use of technology by FL learners in Hong Kong, both studies reported overwhelmingly positive beliefs. Lai (2013) observed that language learning motivation, perceived usefulness of technology for learning, and perceived compatibility between technology use and learning expectancies dominated in shaping technology use. In the same context, Lai and Gu (2011) found that students used a variety of technologies outside of class and did so more frequently than in class. They held highly positive beliefs about the use of technology to increase motivation, monitor learning progress, encourage oneself to commit to learning goals, expand learning resources, and enhance cultural understanding. The same was not the case for communicating with and seeking help from native speakers (NSs) and other learners, about which participants expressed some discomfort.

Two other studies were conducted in different geographical contexts. Öz (2015) examined freshmen students' beliefs toward technology in Turkey and found that beliefs toward CALL were positively correlated with beliefs toward FL learning. More specifically, extrinsic and intrinsic motivation, as well as teacher influence, were predictors in learners' beliefs toward CALL. Additionally, females had more positive beliefs than males, and participants' years of experience learning the L2 and academic achievement positively correlated with their beliefs toward CALL. Fatemi Jahromi and Salimi (2013) conducted a study in Iranian high schools. They compared students' and teachers' beliefs toward CALL, cultural perceptions regarding CALL, computer literacy, and computer access, finding that while students' beliefs were positive, those of teachers were even more so.

Learner beliefs are highly context specific, and learners from different cultural backgrounds can have different beliefs about language learning (Horwitz, 1988). The studies reviewed above (Fatemi Jahromi & Salimi, 2013; Lai & Gu, 2011; Lai, 2013; Öz, 2015) were conducted in specific contexts and focused on high school students and teachers, freshmen university students, or examined specifically learners' self-regulated use of technology outside of class. Findings of these studies may not necessarily hold true for other institutions or countries, and more research on this topic and in other contexts is warranted.

Target language (TL) is another contextual factor shown to influence learners' belief systems. Differences between learners studying different TLs were found in learners' beliefs about grammar instruction (Loewen et al., 2009), instructional programs (Rivera & Matsuzawa, 2007), and overall beliefs about language learning (Brown, 2009; Diab, 2006; Horwitz, 1999). However, research on the connection between TL and learners' beliefs toward CALL is lacking. The unique characteristics of a TL may shape how an individual perceives the effectiveness of CALL because of the way the language is taught, the availability of technological tools to learn the language, accessibility to NSs via different CALL tools, etc. Results from Winke, Goertler, and Amuzie (2010) illustrate how TL impacts learners' beliefs toward CALL. In this study, students studying commonly taught languages (CTLs) had an overall higher degree of willingness to take hybrid courses than the students studying less commonly taught languages (LCTLs). Additionally, students learning LCTLs reported having less experience with technology in their courses than students studying CTLs, and thus their beliefs about the effectiveness of CALL were undermined. As Blake et al. (2008) suggested, using non-Roman alphabets on the computer is challenging for students who are mostly familiar typing in the Roman alphabet. This may explain why students learning languages with non-Roman scripts were more wary of using computers. Taken together, results of Winke et al. (2010) and Blake et al. (2008) reveal that TLs play a role in how language learners perceive the usefulness of technology in learning a FL and can be an important factor in forming their beliefs toward CALL.

Familiarity with technology appears to be another prominent factor in learners' beliefs toward CALL. Murday et al. (2008) reported that language learners taking online courses did not display positive attitudes to chat sessions unless they were shown how to use such technology effectively. Reinders and Wattana (2015) found Thai university students who did not have experience with digital games preferred more traditional activities like talking face-to-face with their classmates, even though studies have generally found games to be enjoyable and highly motivational for learners (e.g., Anyaegbu, Ting, & Li, 2012; Gee, 2007). Other studies reporting that familiarity with technology, and in particular as it applies to language learning, affects learners' beliefs or attitudes toward CALL are Lu, Throssell, and Jiang (2013), Steel and Levy (2013), and Winke et al. (2010).

As context plays a role in learners' beliefs (Lai, 2013; Stockwell, 2013; see Wesely, 2012, for a review), we set out to examine learners' belief systems in a specific U.S. university context—an institution that had been offering a wide variety of FL programs primarily through traditional face-to-face instruction and was considering implementing hybrid and online courses. Given that some language programs at that university tended to use more technology

than others (e.g., German), we wanted to investigate how the variables of TL and familiarity with technology may influence learner beliefs. The choice of these two variables to investigate is also supported by prior research (reviewed above) indicating that learners' exposure to and familiarity with technology, as well as the TL, can influence their beliefs.

In this study, CALL is defined as any form of technology use in fully online, hybrid, and face-to-face formats. Based on previous research investigating the impact of technology use in and out of class on self-regulated learning behaviors (e.g., Lai & Gu, 2011; Lai, 2013), we also compared in-class and outside-of-class use of technology to examine whether the same results would surface in our context. The research questions guiding the present study are:

1. What are the underlying patterns of the beliefs toward CALL held by a group of American university students learning foreign languages?
2. To what extent do the patterns of learners' beliefs toward CALL differentiate between FL learners (a) studying different TLs and (b) having different degrees of exposure to technology?

Method

Participants

The study was conducted at a large Midwestern university in the United States. More than 4,000 students enrolled in FL classes at this university were invited to participate in this survey study. A total of 2,061 students responded anonymously to the survey outside of class. The response rate was 51%.

Participants were studying one of nineteen TLs (across various levels of instruction), with Spanish, French, Japanese, German, Chinese, and Arabic being the most frequently studied languages. 61% of participants were female, 37% were male (2% missing data). They ranged in ages between 18 and 65 (M = 20). The majority were undergraduate students between the ages of 18 and 25 (96.4%) and English NSs (88.9%).

Instrument

The instrument was a survey consisting of three parts: (1) background information, (2) thirty-six Likert-scale questions examining beliefs toward CALL, and (3) two questions on the amount of technology used in the TL inside and outside of language classes.

The thirty-six Likert-scale items, anchored on a six-point scale ranging from 1 ("strongly disagree") to 6 ("strongly agree"), tap into different aspects of learners' belief systems. Due to the exploratory nature of the study, the questionnaire was developed in light of previous research on language learners' beliefs in general and on learner attitudes toward CALL (e.g., Ayres, 2002; Barr,

2004; Horwitz, 1988; Mori, 1999). An extensive literature review helped create the initial list of survey questions, which was finalized based on pilots with FL learners and consultations with experts in the field of applied linguistics.

Data Analysis

To identify the underlying learners' belief structure toward CALL, ratings on the thirty-six questions were pooled and submitted to a principal component analysis (PCA), an exploratory procedure (Field, 2009). PCA is a statistical technique used to analyze the relationships among a large number of variables in order to explain these relationships in terms of a smaller number of dimensions. The procedure helps reduce the dataset down to some key components, stripping away any unnecessary factors that do not explain the underlying belief system well. To determine which factors are important to retain in the analysis, eigenvalues which indicate the substantive importance of that factor are used as the criterion. We used eigenvalues above 1 as the cut-off point for identifying the final list of factors (Field, 2009). Factor loadings of .40 or greater were considered important (Stevens, 1992). The assumptions regarding PCA, including sample size, Kaiser-Mayer-Olkin (KMO) value, and sphericity were investigated and met. Cronbach's *a* for the questionnaire was .96, indicating sufficient instrument reliability for conducting a PCA (Field, 2009).

To examine whether the amount of time using technology and the TL affect learners' beliefs toward CALL, two-way ANOVAs were performed. Factor scores produced after the PCA served as the dependent variables in the ANOVAs. The independent variables were the in-class technology use (up to one hour per week versus more than one hour, henceforth labeled as "low technology use" group and "high technology use" group, respectively), outside-of-class technology use ("low" and "high" technology use groups), and language studied (Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Russian, Spanish, and Other).

Using PCA, we identified four underlying factors that comprise the learners' beliefs toward CALL (see details in the Results section). Two separate ANOVAs were performed to analyze the in-class and out-of-class technology use. The interactions between the amount of in- and out-of-class technology were not considered because three-way ANOVAs with unbalanced designs (i.e., independent variables with different levels) are conceptually difficult to interpret (Cohen, 2001). A two-way ANOVA with *in-class* technology use and TL as independent variables was first conducted on each of the four factor scores. A Bonferroni correction was applied to account for Type-I error, resulting in the alpha level of .013 (.05 divided by 4). Then, the same analyses were conducted with technology use *out-of-class* and TL as independent variables. The assumptions of ANOVAs were investigated and met.

Results

Research Question 1: What are the underlying patterns of the beliefs toward CALL held by a group of American university students learning foreign languages?

Descriptive statistics of the thirty-six survey questions are shown in Table 1. The means for most items range between 3.0 and 4.25, suggesting that the learners surveyed had somewhat positive beliefs toward CALL.

Table 1
Descriptive Statistics and Factor Loadings for Learner Beliefs

Item	Factors				Descriptive Statistics	
	1	*2*	*3*	*4*	*Mean*[a]	*SD*
I. Motivation and attitudes toward CALL					3.59	
Using technology to learn a language can help me get higher exam scores.	.866				3.72	1.29
I can acquire better knowledge of a language by using technology.	.840				3.83	1.30
I would feel frustrated if we didn't use technology in my language classroom.	.826				3.03	1.40
I feel motivated if my teacher uses technology in the language classroom.	.804				3.50	1.24
A language classroom that uses technology provides more learning opportunities than a traditional language classroom.	.681				3.80	1.37
Using technology to learn a language is interesting to me.	.677				3.63	1.31
I am motivated when I use technology to learn a language.	.627				3.32	1.27
It is important to balance traditional language teaching with the use of technology in a language classroom.	.622				4.09	1.36
Language teachers should use technology in their language classes.	.604				3.85	1.24
I wish I were required to use more technology for my language class.	.574				2.84	1.30
When I use technology I get more opportunities to practice my language.	.536				3.72	1.31
I feel a sense of achievement when I use technology to learn a language.	.527				3.05	1.26

I like using technology to learn a language.	.489				3.82	1.24
Technology can facilitate my language learning.	.467				3.91	1.19
Technology is important for language learning.	.407		.401		3.57	1.32
II. The use of technology in the current language class					3.98	
I am satisfied with the technology used in my language class.		.860			4.09	1.24
I am happy with the amount of technology in my language class.		.796			4.18	1.21
Technology used in my language class is quite modern.		.646			3.69	1.30
I like the technology used in my language class.		.552			3.88	1.25
In my language class not enough technology is used.		-.542	.488		2.86	1.34
The technology used in my language class is relevant for language learning.		.504			4.03	1.24
The technology used in my language class improves the quality of my language education.		.480			3.81	1.22
III. The benefits of CALL					3.22	
People will admire me if I use technology to learn a language.			.819		2.56	1.34
Using technology to learn a language is more effective than learning by traditional teaching methods.			.671		3.00	1.33
Technology helps me save time in learning a language.			.650		3.26	1.31
Using technology in a language class is fun and less like work.			.584		3.39	1.39
I get better grades in a language class that uses technology.			.543		3.19	1.30
Using technology for language learning will benefit my career development.			.488		3.65	1.34
I feel satisfied when I use technology to accomplish different language learning tasks.			.474		3.54	1.23
IV. The relevancy of technology skills and associated benefits					3.78	
Having good computer skills is helpful when using technology in a language class.				.805	4.28	1.27

Technology helps me receive quick feedback from my teacher.		.510	4.10	1.40
Technology helps me connect to people who speak the language natively.	.418	.470	3.52	1.43
Teachers need to provide students with more technical training and technical support in a language class that uses technology.		.442	3.26	1.27
Technology makes individualized instruction possible.		.433	3.72	1.29
Items with loadings less than .4				
Technology makes language learning more convenient.			3.88	1.31
Technology allows me to participate more in language learning tasks.			3.64	1.22

Note. An average score for the items on each factor is also provided.[a] A lower score indicates a less positive attitude toward technology.

The PCA singled out four factors with eigenvalues greater than 1, which together accounted for 63% of the variance (see Table 2). An oblique rotation (direct oblimin) was used because the factors were interrelated.

Table 2
Principal Component Factor Analysis

Factors	Eigenvalue	Variance (%)	Cumulative (%)
1: Motivation and attitudes toward CALL	17.616	48.934	48.934
2: The use of technology in the language class	2.758	7.661	56.595
3: The benefits of CALL	1.294	3.598	60.191
4: Relevancy of technology skills and associated benefits	1.095	3.041	63.232

The first factor extracted addresses the efficacy of CALL and its connection to motivation. It includes beliefs toward technology and its usefulness for language learning (e.g., "Technology can facilitate my language learning"), learners' beliefs about traditional face-to-face versus technology-enhanced language classes, and motivational aspects of CALL (e.g., "I am motivated when I use technology to learn a language"). The second factor contains items which address satisfaction with technology used in the learners' foreign language classes (e.g., "In my language class not enough technology is used"). The

third factor addresses specific benefits of CALL, such as peer approval, enjoyment, saving time, getting better grades, developing a career, and feeling satisfied when accomplishing language learning tasks. Finally, the fourth factor addresses familiarity with technology and its benefits for language learning, such as the need for having good computer skills and receiving technical support from teachers.

Research Question 2: To what extent do the patterns of learners' beliefs toward CALL differentiate between FL learners (a) studying different TLs and (b) having different degrees of exposure to technology?

Figures 1 through 4, which are based on factor scores, show that, in general, learners who had experienced more technology inside their language classes answered more positively on the four factors (see Table 1 for the four factors). TL also impacted learners' beliefs. The results of two-way ANOVAs (see Table 3) showed that there were significant main effects for both the amount of in-class technology use and TL, and that there was a statistically significant interaction between these two variables for two of the factors (more details are provided below).

There was a significant interaction between in-class technology use and TL for factors 1 and 2 (see Table 3), indicating that learners' technology use in class varied depending on the TL studied. While for learners of most TLs higher in-class technology use resulted in more positive beliefs, for learners of German, Russian, and Italian higher in-class technology use either lowered learners' beliefs or did not increase them (see Figures 1 and 2). Learners of Hebrew had the most pronounced differences in beliefs regarding the amount of technology used in class.

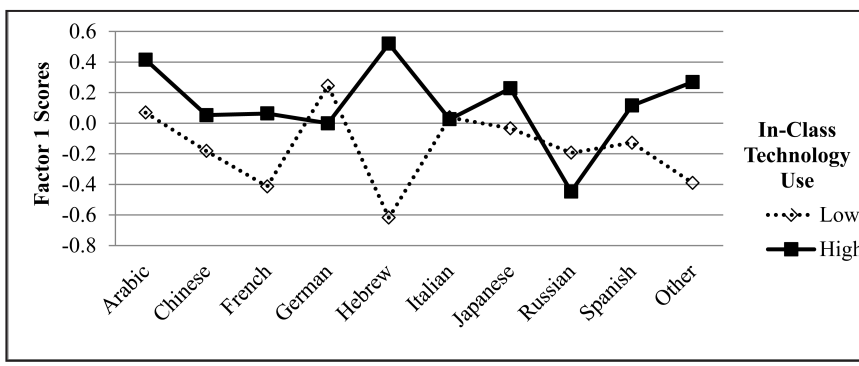

Figure 1. Factor 1 (motivation and attitudes toward CALL) scores by in-class technology use and target language.

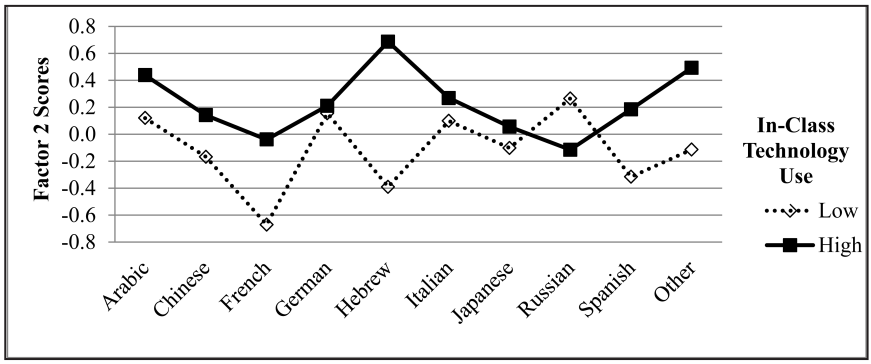

Figure 2. Factor 2 (use of technology in language class) scores by in-class technology use and target language.

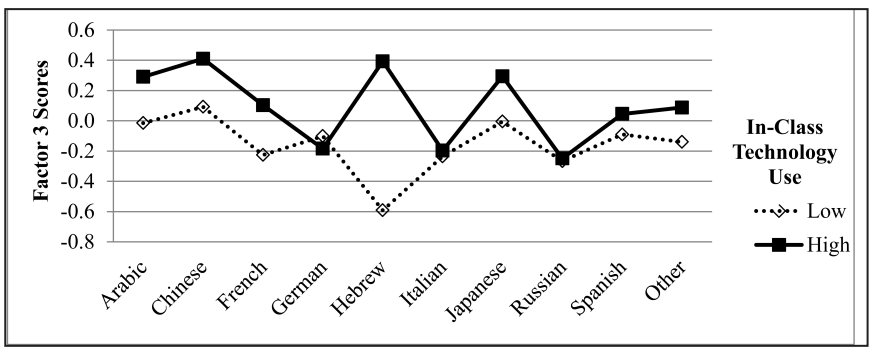

Figure 3. Factor 3 (benefits of CALL) scores by in-class technology use and target language.

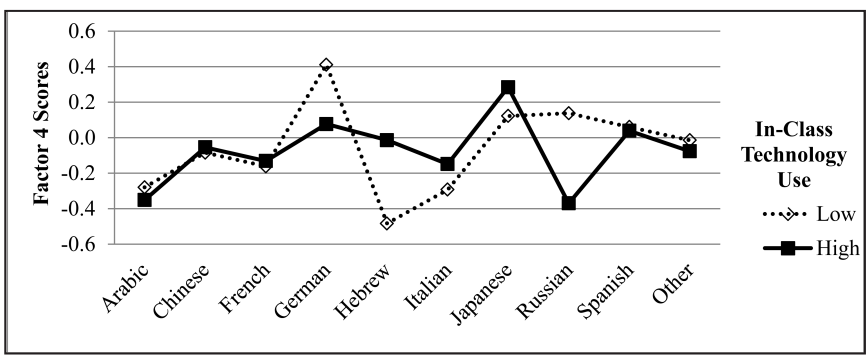

Figure 4. Factor 4 (relevancy of technological skills and associated benefits) scores by in-class technology use and target language.

Table 3
Results of Two-Way ANOVA for Technology Use in Class and Target Language

	Type III SS	MS	*df*	*F*	*p*	η_p^2
			Factor 1: Motivation and Attitudes Toward CALL			
In-class technology use	15.434	15.434	1	16.085	.001*	.009
TL	20.567	2.285	9	2.382	.011*	.012
In-class technology use x TL	25.527	2.836	9	2.956	.002*	.015
Error	1,670.490	.960	1,741			
			Factor 2: The Use of Technology in the Language Class			
In-class technology use	22.558	22.558	1	24.770	.001*	.014
TL	46.970	5.219	9	5.731	.001*	.029
In-class technology use x TL	22.486	2.498	9	2.743	.003*	.014
Error	1,585.523	.911	1741			
			Factor 3: The Benefits of CALL			
In-class technology use	12.550	12.550	1	12.803	.001*	.007
TL	21.495	2.388	9	2.436	.009*	.012
In-class technology use x TL	11.141	1.238	9	1.263	.252	.006
Error	1,706.576	.980	1741			
			Factor 4: Relevancy of Technology Skills and Associated Benefits			
In-class technology use	.049	.049	1	.049	.824	.001
TL	36.099	4.011	9	4.071	.001*	.021
In-class technology use x TL	9.582	1.065	9	1.080	.374	.006
Error	1,715.551	.985	1,741			

* $p < .013$

Results of the two-way ANOVAs returned a significant main effect for technology use for factors 1, 2, and 3, suggesting that the differences between the low and high in-class technology use groups were statistically significant on these factors. A significant main effect for TL for all factors was observed, indicating that the differences between TLs were statistically significant; learners of French being set apart from many other TLs for all factors was the main tendency (according to post-hoc tests). However, the effect sizes ($\eta p2$ < .059) for all statistically significant differences found were small (Cohen, 1988).

With regard to out-of-class use of technology, the results of two-way ANOVAs (see Table 4) showed a significant main effect for technology use for factors 1, 2, and 3. Learners who used more technology outside of class answered more positively on these three factors (also see Figures 5–8). A significant main effect for TL was observed for factors 2 and 3. Again, learners of French were set apart from all other TLs. Contrary to the findings on in-class technology use, no statistically significant interaction between out-of-class technology use and TL was observed for any of the factors.

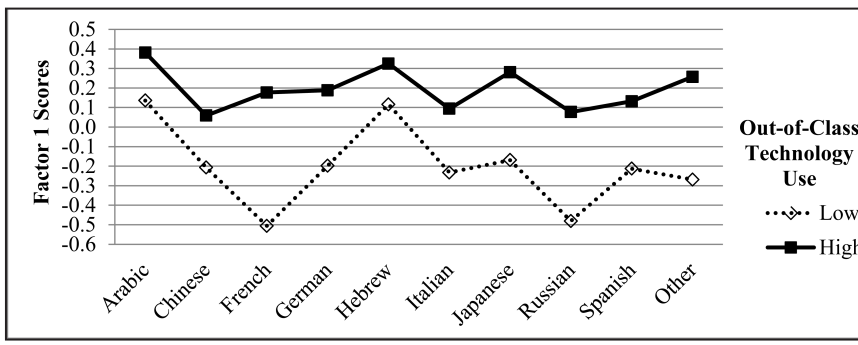

Figure 5. Factor 1 (motivation and attitudes toward CALL) scores by out-of-class technology use and target language.

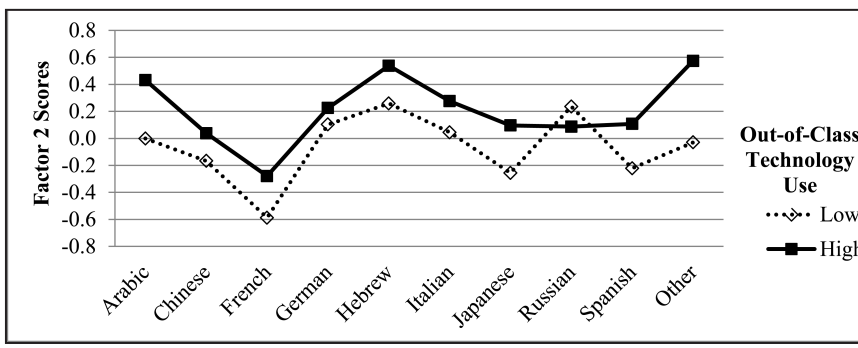

Figure 6. Factor 2 (use of technology in the current language class) scores by out-of-class technology use and target language.

Table 4
Results of Two-Way ANOVA for Technology Use Outside of Class and Target Language

	Type III SS	MS	*df*	*F*	*p*	η_p^2
			Factor 1: Motivation and Attitudes Toward CALL			
In-class technology use	15.434	15.434	1	16.085	.001*	.009
TL	20.567	2.285	9	2.382	.011*	.012
In-class technology use x TL	25.527	2.836	9	2.956	.002*	.015
Error	1,670.490	.960	1,741			
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In-class technology use x TL	22.486	2.498	9	2.743	.003*	.014
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In-class technology use x TL	11.141	1.238	9	1.263	.252	.006
Error	1,706.576	.980	1741			
			Factor 4: Relevancy of Technology Skills and Associated Benefits			
In-class technology use	.049	.049	1	.049	.824	.001
TL	36.099	4.011	9	4.071	.001*	.021
In-class technology use x TL	9.582	1.065	9	1.080	.374	.006
Error	1,715.551	.985	1,741			

* $p < .013$

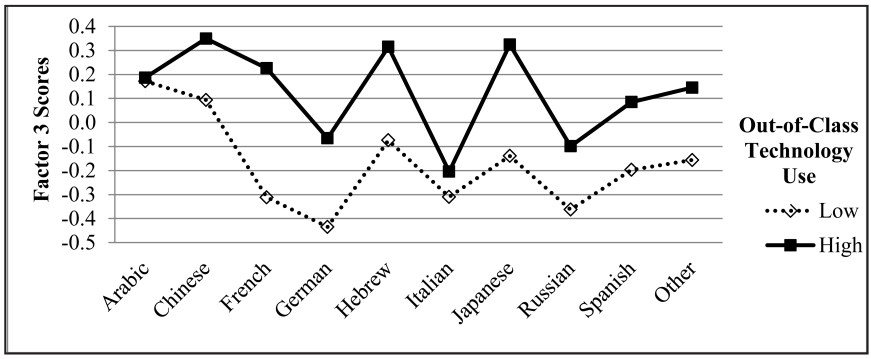

Figure 7. Factor 3 (benefits of CALL) scores by out-of-class technology use and target language.

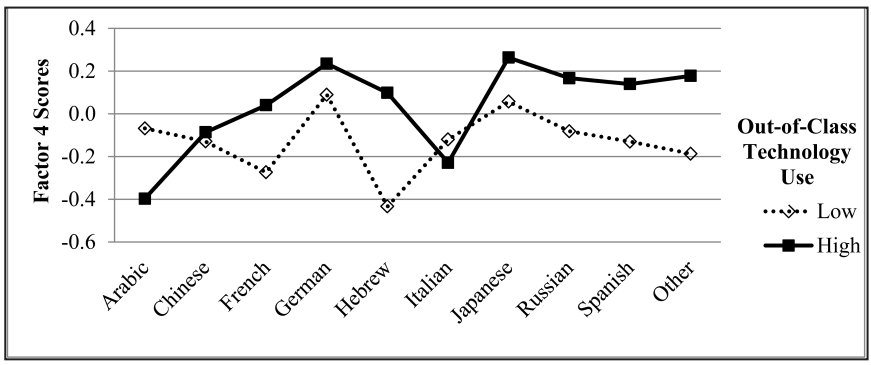

Figure 8. Factor 4 (relevancy of technology skills and associated benefits) scores by out-of-class technology use and target language.

Discussion

Learners' Belief Systems

The purpose of this study was to unravel language learners' belief systems toward CALL among a group of American college students who were learning nineteen different FLs at a Midwestern university, and to determine whether the students' degree of exposure to technology and the TL they were learning were associated with their belief structure. Results of the PCA reveal four distinctive factors comprising learners' beliefs about CALL.

- *Factor 1. Motivation and beliefs toward CALL.* Learners who felt motivated when using technology to learn a FL held more positive beliefs about the effectiveness of CALL. This supports previous research that

learners' attitudes and beliefs correlate with motivation (e.g., Ayres, 2002; Chen & Yang, 2014; Lai, 2013; Mori, 1999; Sydorenko, 2011).

- *Factor 2. The use of technology in the current language classes.* Learners who were more satisfied with the quality or quantity of technology use in their language classes held a more positive attitude toward CALL.
- *Factor 3. The benefits of CALL.* When the learners discerned more benefits of using technological tools in FL learning, they appeared to have more positive beliefs toward the effectiveness of CALL.
- *Factor 4. The relevancy of technology skills and associated benefits.* When learners felt that having good computer skills is important, they tended to possess more positive beliefs toward CALL.

The Intensity of Learners' Belief Systems

Results of the descriptive statistics suggest that while the learners expressed generally positive beliefs toward CALL, their intensity was not uniformly strong. The learners were most positive when rating their satisfaction with technology in their language class as compared to the other three factors. This observation highlights the importance of the quality of CALL use to foster positive beliefs among FL learners.

Another similar pattern was that learners' beliefs about specific benefits of CALL were also moderately positive. The group of learners surveyed may not have fully realized the potential benefits of CALL or did not fully utilize them, thereby overlooking their potential for language learning. For example, our participants only mildly agreed with the statement that technology helps them connect to NSs. This finding is surprising given that previous research has found that access to NSs is one of the most significant technological benefits (e.g., Chen & Yang, 2014; van Compernolle & Williams, 2009). Since most of the learners were English NSs, they may not find it easy to reach out to TL speakers because of the predominate use of English in online environments. Another possibility is that these learners may be apprehensive of communicating with strangers online, either for security reasons or due to a perceived lack of proficiency or common topics (Chen & Yang, 2014; Lai & Gu, 2011).

With regard to the relevancy of technology skills, the learners thought that having good computer skills is more important than the technical support provided by a teacher, suggesting that sufficient technical training or good computer skills (e.g. Arnold, 2007; Ayres, 2002; Barr, 2004) is imperative in fostering positive beliefs toward CALL.

The Effect of Technology Use and TL

Results of the study indicate that learners' beliefs toward CALL can be differentiated based on the amount of technology use in the classroom in light of

three factors: usefulness of technology and motivation, satisfaction with technology used in class, and benefits of technology. For example, learners who used technology more than one hour per week in their classes had more positive beliefs than those who used it for less than one hour. Learners who had higher exposure to technology in the classrooms were more motivated to use technology to learn a FL, more satisfied with the technology used in their language classrooms, or convinced of its benefits. In other words, the more technology learners are exposed to in language learning, the more they may value it and the more positive their beliefs toward CALL may be (Reinders & Wattana, 2015; Sydorenko, 2011). This same pattern was found for learners' use of technology outside of class, a finding in line with prior research: language learners' beliefs are ever-changing and are shaped by the individual's interaction with their environment (Alanen, 2003; Woods, 2003).

With regard to the effect of TL on language learners' beliefs, there are several explanations. For each TL, students who used more technology in class generally had more positive beliefs than those who used less, and for learners of Hebrew, this difference was the most pronounced. However, this was not the case for learners of Russian and German (and, for factor 1, Italian). As the descriptive statistics suggest, students of Russian reported using the least amount of technology in class (M = 1.24), while learners of Hebrew reported the highest use of technology (M = 2.16), followed by learners of German (M = 2.14). Since learners of Hebrew and German reported similar amount of in-class technology use, yet displayed different beliefs, factors other than amount of technology use seem to be at play. As teachers and peers, among other factors, impact the use of technology in the language classrooms (Lai, 2013; Margaryan, Littlejohn, & Vojt, 2011), the particular dynamics in the Russian, German, and Hebrew courses may have contributed to this perception.

On the other hand, no interaction was found between out-of-class technology use and TL, indicating that there was no strong relationship between how much students use technology on their own time and how they perceive the effectiveness of CALL based on the TL. One thing that may contribute to fostering stronger beliefs in the benefits of CALL among these students is the degree of self-regulated use of technology in language learning. In terms of the effect of TL studied, factors such as the differences in how language teaching is carried out in this context, the experience of technology use in class, the nature of the FL curriculum, and teachers' beliefs toward CALL may also influence students' perceptions of CALL. This points to the multifaceted nature of one's belief system and the dynamics of the interplay among the different factors that comprise the system (Barcelos & Kalaja, 2011).

The findings of our study connect with previous research in several ways. First, they corroborate Lai and Gu's (2011) and Lai's (2013) studies in Hong

Kong and Öz's (2015) study in Turkey, suggesting that learner beliefs toward CALL are largely influenced by and associated with one's learning motivation and perceived effectiveness of CALL for language learning. Second, our results underscore the importance of computer literacy in shaping positive beliefs toward CALL—an area that Fatemi Jahromi and Salimi (2013) found critical for their Iranian high school students. Additionally, like Barr's (2004) students in Canada and Great Britain and Lai and Gu's (2011) students in Hong Kong, our learners did not seem to capitalize on some specific benefits that technology can offer, such as communication with NSs. However, the dynamic nature of the belief system toward CALL warrants further investigations that extend beyond the contexts already investigated to provide a fuller view of how the system is shaped and interacts with language learning.

Conclusion

In this large-scale survey study, we identified four factors that shaped learners' beliefs toward CALL within the context of a large Midwestern university. The sample size and number of TLs provide robust and generalizeable results for other similar language learning contexts: traditional, face-to-face FL classrooms at large U.S. universities with a minimal number of hybrid and online courses.

We offer several implications for language teaching. First, to encourage learner buy-in, CALL use should be well designed and motivating for learners (also see Lai & Morrison, 2013). Benefits of CALL should also be made transparent to learners, either through reflection or by having instructors share their rationales. Additionally, learners should be encouraged to use technology outside of class. These steps should all foster more positive beliefs about CALL and in turn lead to more CALL use.

We also provide several suggestions for future research on the topic of learner beliefs toward CALL. First, as learner beliefs appear to be highly context specific, a variety of other contexts should be examined. Our study also raises questions regarding factors that can influence learner beliefs. It remains unclear how TLs interact with technology use and beliefs toward technology. Thus, future research should include studies of CALL beliefs that can be connected to the specific ways CALL is integrated or used in the curriculum. From our study, it is unclear if any differences are due to the TL itself (e.g., writing system, availability of CALL resources) or its curriculum (teacher centered vs. learner centered; communicative vs. more traditional) or CALL use at this university. Future exploration of these issues and how different subcomponents of the belief structure interact with each other can help inform the implementation of CALL in various contexts.

Notes

1. An eigenvalue is a number that indicates the amount of variation explained by a factor.
2. The sample size was adequate for conducting PCA. A common rule is 10 to 15 samples per variable. There were 36 variables in this study, so the sample size should be at least 360 to 540. The sample size was 2,061. The KMO value and results from the Bartlett's test of sphericity are often used to determine whether a data set is factorable. The large KMO value (.977) and significant results from the Bartlett's test of sphericity, $\chi 2\ (630) = 48{,}185.032$, $p < .001$, indicate an acceptable data set (Field, 2009).
3. All four dependent variables were normally distributed within the two groups with different amounts of technology used in class and with different TLs studied. The homogeneity of variances assumption (using Levene's test) was also met.

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