

Looking for a Needle in a Haystack: CALL and Advanced Language Proficiency

Jack Burston¹ and Kelly Arispe²

Abstract

The goal of this meta-analysis is to evaluate how instructional technology has impacted advanced second language (AL2) development. Although numerous meta-analyses have been conducted within the CALL literature over the past two decades, they primarily focus upon learning outcomes and related effect sizes. None focus on advanced learning per se. Where AL2 is even mentioned, which is only rarely, little or no attention is paid to critical research parameters within the studies that are analyzed. Most notably, in summarizing learning outcomes, the linguistic competence of learners claimed to be at advanced level is simply taken at face value. So, too, no consideration is given to the difficulty level of tasks undertaken by students or their appropriateness to students' claimed proficiency. It is the intent of this general overview of the contribution of CALL to AL2 to address these issues through a comprehensive analysis of the publications in four prominent CALL journals (CALICO, CALL, Language Learning & Technology, and ReCALL) over some 30 years. In so doing, the Performance Descriptors (PD) and NCSSFL- Can-Do Statements (CDS) of the American Council on the Teaching of Foreign Languages (ACTFL) are adopted as external criteria for establishing student competence level, task difficulty, and appropriateness. This study concludes that not only are CALL AL2 studies extremely limited in number and focus, but also that they suffer from serious design flaws that call into question a great portion of the claims made regarding the contribution of instructional technology to the furthering of advanced-level foreign language competence.

KEYWORDS: ADVANCED LANGUAGE, META-ANALYSIS, PROFICIENCY, ACTFL, INSTRUCTIONAL TECHNOLOGY

Affiliations

¹Cyprus University of Technology.
email: jburston@cut.ac.cy

²Boise State University.
email: kellyarispe@boisestate.edu

1. Introduction

This meta-analysis evaluates the contribution of Computer-Assisted Language Learning (CALL) to the learning outcomes of advanced-level foreign language instruction (AL2) from 1983 to 2015 as reflected in the pages of four prominent CALL journals: *CALICO Journal*, *CALL*, *Language Learning & Technology (LL&T)*, and *ReCALL*. Firstly, it summarizes descriptive data for CALL AL2 implementation studies in these four journals. Secondly, it evaluates the experimental and pedagogical design within those studies to determine if CALL was effective in moving learners along the continuum to advanced language proficiency. To date, no meta-analysis within CALL has looked at these two parameters.

Without undertaking a worldwide, or at least nationwide, survey of classroom implementations, there is of course no way of knowing the full extent to which CALL has helped to improve the teaching and learning of AL2. Published CALL research, however, arguably provides a valid and informative measure of what the most professionally engaged technology adopters have done in this respect. In considering the contribution of instructional technology to AL2 teaching, one is immediately struck by how little of the published CALL research concerns itself with advanced language learners. In fact, fewer than 3% of the articles in the selected journals fall into this category. The paucity of work in this area stems from three contributing factors: technological, pedagogical, and institutional. Although computer technology has been applied to language instruction for over 50 years, it has only been within the past decade that multimedia communication affordances have been widely available to support language learning beyond beginning and intermediate levels. While some attempts have been made to produce innovative interactive programs for more advanced-level learners, given what the technology was able to accommodate, until recently most pedagogical applications have been restricted to behaviorist, structuralist, drilling of grammar and vocabulary acquisition. To this day, even with the exploitation of the most modern technologies, true-false, multiple-choice, and gap-fill grammar and vocabulary exercises remain widespread. Quite independently of technological constraints, foreign language instructional technology has lagged, and continues to lag, behind the kind of learner-centered, communicative, pedagogical practices that lend themselves to more advanced-level competence. Above all, the lack of AL2 research in CALL is a reflection of the dearth of foreign language instruction at this level. This is particularly so in the United States.

In the US, according to the American Council on the Teaching of Foreign Languages (ACTFL) K–12 Foreign-Language Report (2010), only 18.5% of K–12 students were learning a foreign language. At the post-secondary level, in 2013 less than half that percentage was enrolled in foreign language courses

(Goldberg, Looney, & Lusin, 2015). Moreover, foreign language study in America takes place almost entirely below the intermediate level (Adelman, 1995). While this would be expected in primary and secondary schools, the same holds true in colleges and universities. Where they exist, which is only in about half of post-secondary institutions (Lusin, 2012), foreign language BA/BS degree requirements are usually met with first-year beginners' courses. Only in institutions that require two years of study, which account for less than a quarter of those with a foreign language requirement (Lusin, 2012), do successful learners begin to reach an intermediate level of language competence. In 2013, of the total undergraduate foreign language enrollments, less than 1% were fourth-year majors (Goldberg *et al.*, 2015). However, even among graduating foreign language majors, judging by the results of published assessments of their L2 competence, advanced-level instruction cannot be taken for granted. In the 50 years since Carroll (1967) undertook an extensive survey of graduating foreign language majors, the language competence level of a large proportion of graduating foreign language majors remains at intermediate-high. According to the most recent evaluation of the competence level of graduate teacher certification candidates (Glisan, Swender, & Surface, 2013) nearly half (46%) failed to score above intermediate-high on the ACTFL scale (ACTFL, 2015a).

The persistent existence of such low-scoring results was the catalyst in exploring the role that CALL has played in furthering AL2 proficiency. If just 54% of graduating teacher candidates, who presumably are among the most motivated language students, are reaching advanced levels even in commonly taught languages like English, Spanish, and French, it warrants investigating how technology has affected learning outcomes at the advanced level. Thus, the present meta-analysis investigates the extent to which CALL has contributed to improved AL2 proficiency, as reflected in published research studies and measured by ACTFL criteria.

2. The Question of Proficiency

Broadly speaking, foreign language proficiency can be measured qualitatively or quantitatively. Though certainly useful, by its very nature qualitative assessment can easily suffer from vagueness and lack of substantiation, especially when it is based on self-evaluations. To be meaningful, it needs to be supported by clearly defined descriptors and, ideally, complemented by objectively confirmed results. It is precisely this objective that ACTFL guidelines¹ seek to realize. ACTFL defines proficiency as “the ability to use language in real world situations in spontaneous interaction and non-rehearsed context and in a manner acceptable and appropriate to native speakers of the language” (ACTFL, 2015a, p. 4). Conceptually, proficiency-based definitions

of language learning help learners and educators make sense of language learning and set goals that propel learners forward. ACTFL also provides Performance Descriptors (PD) and NCSSFL-ACTFL Can-Do Statements (CDS; ACTFL 2015b) which, in tandem with the Proficiency Guidelines, can lead to consciousness about realistic expectations for improving language proficiency over time. Additionally, ACTFL provides assessments that determine learners' proficiency level for each of the four skills. Institutions (K–12 and higher education) use ACTFL proficiency-based standards for accreditation and program-assessments. There is good motivation, therefore, to demonstrate how CALL affects language proficiency according to ACTFL criteria.

3. Research Questions

3.1 Previous CALL Meta-Analyses

Cumulative CALL analyses are not new nor are they lacking; in fact, nearly 30 studies have been published in the past dozen years. They have been organized around central themes in CALL: CALL effectiveness (Felix, 2005, 2008), computer-mediated communication (Lin, 2014; Nguyen, 2008), gaming (Chiu, Kao, & Reynolds, 2012), glossing (Taylor, 2013; Yun, 2011), mobile-assisted language learning (Burston, 2015) and synchronous computer-mediated communication (Ziegler, 2015), to name a few. Most recently, Plonsky and Ziegler (2016) conducted a second-order synthesis (i.e., a meta-analysis of meta-analyses) to determine the overall effectiveness of CALL projects in general, as well as to look specifically at methodological rigor in ten meta-analyses. Among these, Lin (2014) in particular looks at effect size, taking into consideration a myriad of variables including learners' L2 proficiency levels. It is to be noted that Lin corroborates the findings of the present analysis in regard to the very low presence of AL2 studies. So, too, Lin points to a pervasive experimental design flaw in that a majority of studies simply make assumptions about the level of the participants in their study with no supporting evidence, thereby raising concern about any conclusions drawn regarding the effect of CALL on learning outcomes:

Furthermore, to investigate if learners' target language proficiency has an impact on the effect of CMC, effect sizes were calculated for three levels of proficiency: elementary, intermediate and advanced. The results show that elementary-level students benefit more from CMC than both intermediate- and advanced-level students. The level of proficiency was determined by the primary researchers, who employed various types of measurements or who simply made such judgments based on their understanding of the students, and thus this variable is by no means to be taken as valid. (Lin, 2014, p. 134).

Despite the impressive number of parameters included in Lin's study, one critical variable is missing: the proficiency level required by the task in question. This isn't addressed either in any of the other studies reviewed by Plonsky and Ziegler (2016). In sum, CALL meta-analyses to date come to fundamental conclusions about the relationship between CALL and Second Language Acquisition (SLA) which to a large extent are predicated on assumptions and vague details about learner proficiency levels and the linguistic competency required to complete project tasks.

3.2 Research Questions

To date, there has been no meta-analysis that centers on AL2 proficiency in CALL. Using Lin (2014) as a point of departure, the present study focuses on descriptive and analytic inquiries relating to the five fundamental research questions below:

1. How are CALL AL2 studies characterized?
2. What is the claimed proficiency level of the participants and how is this substantiated?
3. What is the proficiency level required by assigned tasks and how is it substantiated?
4. Do CALL materials in question improve AL2 learners' linguistic proficiency?
5. What is the relationship between linguistic task difficulty and the proficiency level of the participants?

4. Methodology

4.1 Selection Criteria

Identification of the papers involving AL2 in the four journals examined here was considerably less straightforward than might be expected. One reason for this is that online archives differ in the search flexibility they offer. *CALICO* and *CALL* support keyword searches of full texts independently of volume and issue, i.e., they find search strings anywhere in the entire archive. *LL&T* and *ReCALL*, on the other hand, only allow individual title indexes to be searched by volume and issue. A second reason for the difficulty in locating research data on AL2 is that, surprisingly, the keyword "advanced" does not frequently occur in the title of articles involving AL2. Of the articles initially identified in this study, on average only 25% of the titles contained the word "advanced." Consequently, for the journals that restricted direct searches to title information, the only effective way to locate articles involving AL2 was to read through all the titles, volume by volume, looking for language learning specializations that suggested advanced levels, for

example “LSP, Languages for Specific Purposes,” “ESP, English for Specific Purposes,” “ESAP, English for Specific Academic Purposes,” “academic writing,” etc. Once a suggestive title was located, the abstract was then consulted in search of evidence of reference to AL2. When this proved fruitful, the full article was then manually searched for the keywords “advanced,” “level,” “student,” “participant.” The keyword “methodology” was also searched because, following standard practice in applied linguistics studies, there is typically a section with this name that gives information about participants including their language proficiency level.

Based on the above key word searches, 68 AL2 papers were found in the four journals, out of the some 1840 publications, i.e., only 3.4% of the total. However, this in fact overestimates the number of studies involving AL2, since what is considered to constitute advanced-level instruction is anything but consistent. In a number of cases, authors offer no definition at all other than a generic allusion to the advanced level of the students. When definitions are provided, they are based on four types of criteria: years of previous study, current course enrollment, standardized test results, and *prima facie* evidence. Needless to say, the number of years of previous study provides a very unreliable means of assessing language competence. Were it otherwise, there would be no need for external standardized tests. Likewise, without corroborative substantiation, the mere enrollment in a course labeled Advanced X provides no reliable measure of advanced language level. For this reason, only CALL studies involving advanced-level competency defined relative to objective external assessments and/or convincing *prima facie* evidence were retained for this meta-analysis. External tests included the TOEFL, IELTS, TEPS (South Korea), and Michigan language examinations. *Prima facie* evidence included a variety of factors. Based on the findings of Glisan, Swender, and Surface (2013), it is reasonable to assume that the majority (albeit slim) of fourth-year language students in the US would be at or above the advanced-low level. In any event, students in fourth-year foreign language department courses are as advanced as one will find among undergraduates in US colleges and universities. For these reasons, CALL studies involving fourth-year foreign language students in the US have been included. Studies involving full-time ESL students regularly enrolled as undergraduates or graduates in tertiary institutions where English is the language of instruction were likewise included. Also accepted for inclusion were studies involving third/fourth-year language specialists in institutions where students take only courses related to their L2. So, too, given the higher attested foreign language competence of their students (European Commission, 2012), European university studies at any level were also retained. Owing to the AL2 competence normally required, courses described as advanced-level English for Academic or Specific Purposes were

included as well. Where students in a study had spent considerable time living in a country where the L2 was spoken, this was also taken as corroborating evidence of AL2 competency.

In accordance with the above selection criteria, a total of 53 of the initial 68 AL2 papers remained for analysis. However, six of the latter were eliminated from consideration because they did not involve pedagogical implementations. Two of these were design descriptions, three software reviews, and one a report that focused on instructional technology usage. The remaining 47 pedagogical studies form the basis of this study. The majority of these, 18, were found in *CALICO*, with *LL&T* and *ReCALL* contributing 14 and 10 respectively. Only 5 papers from *CALL* were included. In terms of the relative proportion of the 47 retained AL2 papers to total publications, *LL&T* at 5.3% (14/264) ranked highest followed by *CALICO* with 3% (18/600) and *ReCALL* at 2.7% (10/370). *CALL* ranked last with less than 1% (5/606) of its research publications related to AL2. On average then, when controlled for reliable definitions of advancedness, between 1983 and 2015 only 2.6% of the total publications in the journals under review have dealt with AL2 pedagogical implementations.

4.2 Coding

In all, the 47 studies were coded three times. First, descriptive, face-value information about the studies was summarized in a spreadsheet. Since this information did not require analysis or the use of any external criteria, the researchers worked together to input this data as it related to research question 1. For the second and third rounds of coding, the researchers used external criteria based on ACTFL standards, namely the Performance Descriptors (PD) and Can-Do statements (CDS), to independently keep track of parameters relating to research questions 2 (student competence level), 3 (level of the task) and 4 (did the participants improve?). These descriptors “help educators set realistic expectations at the summative assessment level. The ability to look ahead to the next range of performance allows instructors to create assessments that show what the language learner is able to do within the learner’s current range as well as how well the learner is able to perform in the next higher range” (ACTFL, 2015a, p. 3). Once the level of the participants and the level of the task were determined, the researchers coded for task appropriateness by measuring the difference between the two (i.e., task difficulty-participant level). It was decided that, for any given level of competence, a task that met that level or went just one sub-level beyond was deemed “appropriate,” adhering to the notion of $i + 1$ scaffolding (Krashen, 1981) and the natural progression of proficiency as modeled by the ACTFL documents.

The PD document was used to:

1. Determine the mode of communication in which students engaged: interpretive, interpersonal or presentational;
2. analyze the seven domain descriptions for the mode at the advanced level;
3. code for similarities or matches between key words in the domain descriptions (at the advanced level according to the mode of communication) and the task, learning objective and/or results in the study (i.e., what was measured).

Similarly, the CDSs were used to corroborate that the objective of the task was either at the proficiency level (e.g., advanced-low) or just one sub-level beyond (e.g., advanced-mid) the inferred/given competence level of the participant. This process was akin to that used for the PD:

1. Determine the mode of communication: interpretive (listening or reading), interpersonal or presentational (writing or speaking);
2. analyze the global benchmark description for the mode in the study at the advanced level ranges (i.e., advanced-low, advanced-mid, advanced-high and superior);
3. code for the proficiency level where the task in the study aligns to one of the CDSs according to mode (exact wording was not required but the task(s) in the study and the CDS needed to be similar).

When the PD and CDS documents were consulted for coding in rounds 2 and 3, the researchers did so independently using a Google form. At intervals of 15, the researchers reviewed their responses and highlighted cells where responses did not match. Both researchers then analyzed the study again and communicated their rationale at their next meeting online in order to reach a consensus.

5. Results

Research Question 1: How are CALL AL2 studies characterized?

5.1 Descriptive Data

Although the earliest CALL publications date from the appearance of the *CALICO Journal* in 1983, in the 32 years since then only one of the 47 studies relating to AL2 was published prior to 2000. Afterwards, with the exception of 2010, no more than five AL2 papers per year appear in the combined pages of the four journals under review.

By far, at nearly 37%, the greatest numbers of studies were undertaken in the US, followed by the UK and Taiwan at just under 10% each (Figure 1). The remainder of publications came from a total of 14 other countries.

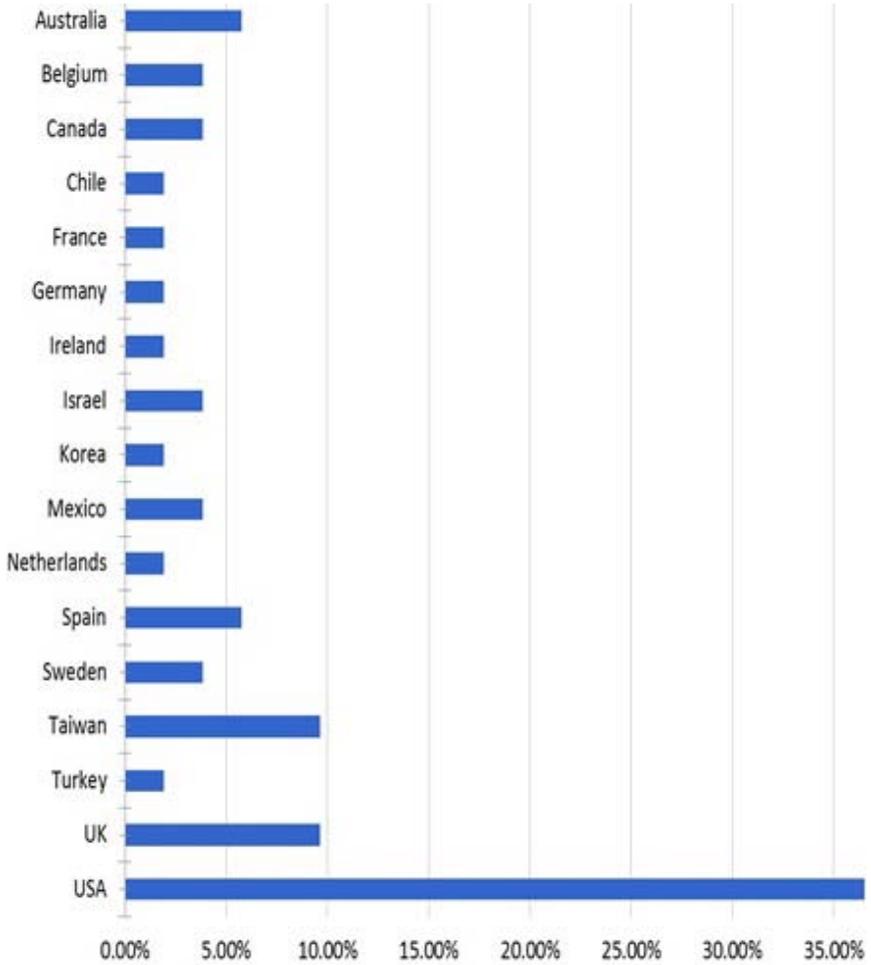


Figure 1: Source countries of AL2 studies

As can be seen in Figure 2, nearly 62% of AL2 studies have targeted ESL/EFL. This is followed in a distant second and third place by German (13.5%) and French (11.5%). Four other languages complete the inventory: Spanish (5.6%), Chinese (3.8%), and Arabic and Russian at less than 2% each.

Lastly, in all, nearly 81% of AL2 studies focused on the written language (Figure 3), of which presentational and interpersonal writing accounted for 63% and interpretive reading 18%. In contrast, presentational and interpersonal speaking and interpretive listening together were targeted in only 16% of the studies.

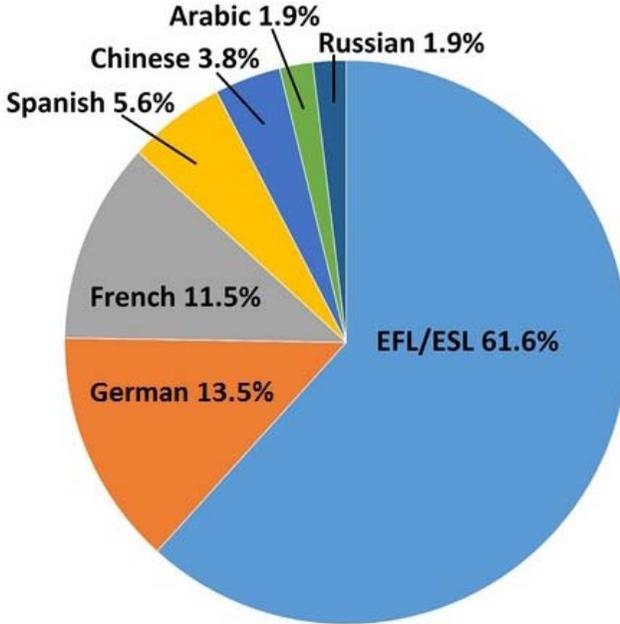


Figure 2: Advanced-level languages

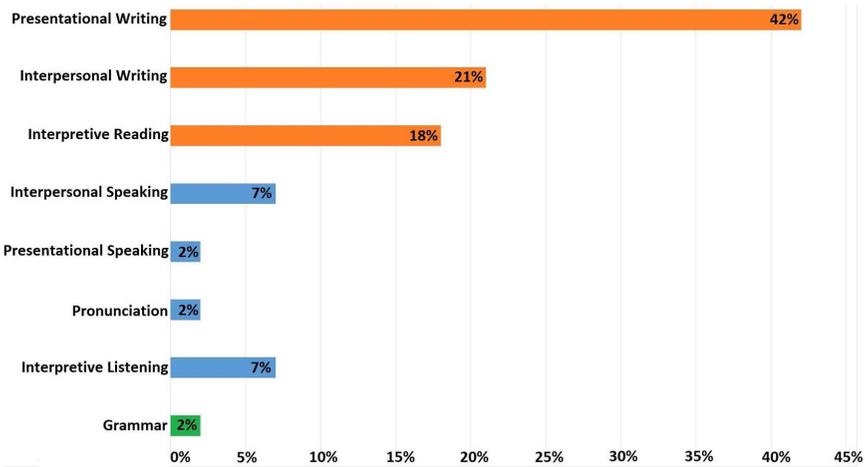


Figure 3: Pedagogical focus

5.2 Linguistic Data

Written Language

Beginning with the predominant written language paradigm, a closer inspection of the 24 AL2 studies that focus specifically on presentational writing

skills reveals that 13 involve collaborative composition activities and 11 individual writing exercises. Seven collaborative projects (14, 27, 29, 30, 36, 39, 40) involve shared input using discussion forums, wikis, blogs, chats, and Google Docs (see Appendix A). Six (3, 13, 19, 22, 24, 43) engage students in peer-based critical feedback using email, blogs, and wikis. Corpus-based studies account for six of the individual writing activities. These involved concordancing activities (6) and the modeling of academic texts (7, 9, 23, 32, 47). A concern with metacognitive self-regulation guided the remaining studies, two of which involve grammatical accuracy (4, 5), one reflective scaffolding (11) one translation commentary (37) and one technology acceptance (41).

A number of the studies that specifically target presentational writing (24, 29, 30, 36, 40) also involve other activities, most notably written interpersonal communication. However, the majority of written interpersonal communication studies (1, 2, 10, 17, 25, 26, 35, 38, 42, 44) focus on text-based CMC (i.e., chats, discussion forums, blogs) which target interaction that does not result in any formal written production. Three of the studies involving presentational writing (24, 30, 36) also engage students in spoken interpersonal exchanges. The most extensive of these (30) was a business scenario role play that also required presentational speaking, online reading, and listening. One other interpersonal communication study (31) also focuses on speaking skills in conjunction with listening comprehension.

The emphasis on the written language is further extended in ten studies that target reading comprehension of online texts. Besides the previously mentioned presentational writing studies (30, 37), four tested the effectiveness of hypermedia texts (12, 15, 16, 18), one trialed an interactive dictionary (20), one worked with concordances (34), another on scanning and skimming skills (28), and one analyzed student reading comprehension strategies (33).

Other Language Areas

In all, only ten studies devote any attention to aural/oral skills. Besides the five already indicated that involve presentational (30) and interpersonal speaking (24, 30, 31, 36), one targeted pronunciation correction (21) and four listening comprehension (8, 30, 31, 45). Lastly, one study was grammar based (46).

Research Question 2: What is the claimed proficiency level of the participants and how is this substantiated?

As mentioned at the outset, the AL2 CALL publications in this study are notably imprecise in identifying the language competency level of students, to the point where 15 (22%) of the original 68 had to be eliminated from consideration because of their vagueness in this regard. The majority of the studies

required interpretation with regard to the proficiency levels of the participants in question. Of the 47 papers involving pedagogical implementations retained in the present study, only nine (19%: 15, 16, 17, 21, 27, 33, 37, 46, 47) explicitly substantiate student L2 competency by reference to objective external test results (e.g., TOEFL scores). Another 12 (25%: 2, 7, 8, 10, 11, 12, 24, 28, 31, 34, 35, 39) specifically identify the competence level of their students (e.g., advanced-low, B1, etc.), but without any corroborating evidence. In the remaining 26 studies (55%: 1, 3, 4, 5, 6, 9, 13, 14, 18, 19, 20, 22, 23, 25, 26, 29, 30, 32, 36, 38, 40, 41, 42, 43, 44, 45) the competency level of students can only be determined based on circumstantial evidence (e.g., graduating L2 majors, students in an AL2 graduate course, admission to a university where the L2 was the language of instruction, etc.).

Based on the information that could be gleaned from these studies, the competence level of 20% of the students described as advanced-level learners was in fact no more than intermediate-high on the ACTFL scale (Figure 4). Only half of the students were above the advanced-low range.

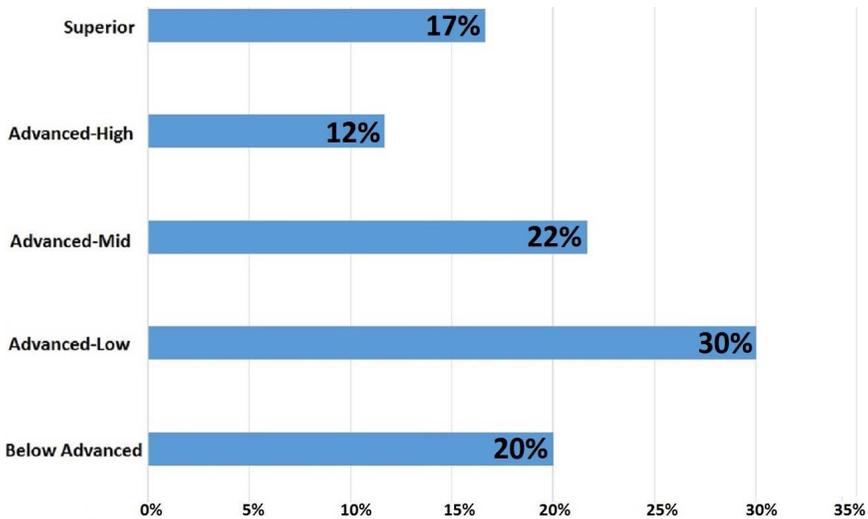


Figure 4: Student L2 level (ACTFL)

Research Question 3: What is the proficiency level required by assigned tasks and how is it substantiated?

Even more so than with the definition of advanced-level competence in the description of CALL AL2 studies, identification of the linguistic level of the actual language activities undertaken by students in the projects leaves much undetermined. The estimated range of language activity levels extends from

intermediate-low to superior, of which 35% are below the advanced level (Figure 5). In fact, of the 47 implementation studies, only one (34) explicitly identified and substantiated task level with reference to an objective external metric. Three others (9, 12, 43) defined the task level explicitly, but without any substantiation. The task level of the remaining 43 (92%) could only be determined through interpretation of the activities undertaken. In all but two cases (38, 40), this nonetheless provided a reasonable estimate of task difficulty level upon which the following analysis is based.

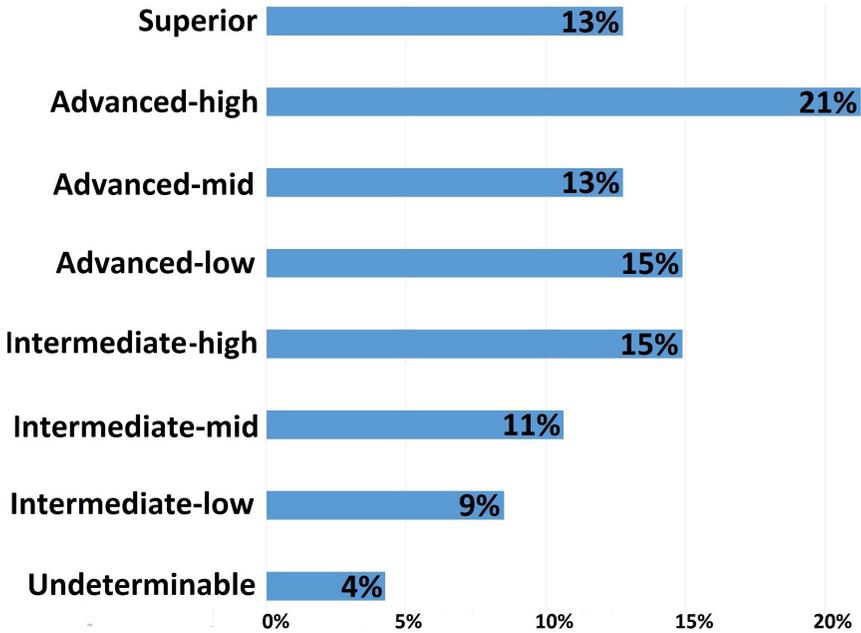


Figure 5: Task difficulty level

In estimating task difficulty, at the easiest and most difficult levels (i.e., intermediate-low and superior) the required competence is reasonably apparent. At the lowest level, one study (21) merely engaged students in pronunciation correction, a second (45) tested listening comprehension with or without captioning in a video about animals, while two others (4, 46) involved checking for basic grammar or spelling errors. These were all activities that could be accomplished at the intermediate-low level. One notch above this in relative difficulty were five projects that involved tasks that did not require more than an intermediate-mid level of competence. One focused on prior knowledge and topic interest in a non-technical text about the origin of the universe (16). Another involved doing repetition and practice exercises prior to free communication and the summarizing of short news events (31). Two projects analyzed the self-initiated e-mail correspondence between students and their

instructors (1, 2). The last was a study in which students were tested on their comprehension of a talk show video recording, wrote sentences using idioms that were encountered, and expressed their opinion about cultural behaviors they observed (8).

Seven projects called upon linguistic competence usually associated with the intermediate-high level. Four (5, 11, 25, 32) required the writing of academic essays with a focus on thematic organization and development. One involved text chat on cultural topics between native-speakers and non-native-speakers (42). Lastly, two studies (18, 34) engaged students in the reading of texts which, though non-technical, were intended for educated native speakers.

Seven tasks were deemed to be at the advanced-low level, three of which involved collaborative writing projects. One required students to maintain a blog relating to L2 work culture, write CVs and cover letters, as well as role-play job interviews (13). In another, pre-service EFL teachers created a wiki summarizing the contents of their English culture course (26). The third engaged students in peer review involving the paraphrasing and synthesizing of outside sources (22). The four other advanced-low tasks focused on cross-cultural comparisons requiring substantial reading and reflective discussion (10, 44) and depth and breadth of vocabulary knowledge (15, 20).

The remaining studies all engaged participants in activities that can unequivocally be deemed to require more advanced L2 competency. The advanced-mid level is represented in six studies, five of which engaged students in collaborative writing. The most extensive of these (24) involved a native-/non-native-speaker blog, supplemented by video chat sessions, requiring cross-cultural reflection and analysis. Two other blogs provided the platform for formal peer review, one focusing on provocative socio-cultural issues (35), the other engaged students in a wide range of writing that included reviews, reports, proposal, and essays (43). Another study exploited a wiki to support the acquisition of genre-based writing conventions (14). The fifth collaborative writing project was based on a Google doc, which students used to integrate and synthesize information on a complex topic from multiple authentic documents (39). The last task at the advanced-mid level required reading professional technical texts and newspaper articles (33).

At ten, the greatest number of advanced competency tasks was at the advanced-high level, all characterized by their highly academic disciplinary nature. Seven of these involved collaborative writing projects using various forms of CMC (i.e., discussion boards, wikis, e-mail, text chat, Google Docs, etc.). Developing argument structure and rhetorical constructs was the focus of three of the studies (3, 19, 29). Three others involved formal academic discussions (17, 27, 36). The seventh study engaged students in both interpersonal and presentational writing tasks as well as reading, speaking, and

listening activities in the context of an extensive professional role-playing project (30). In addition, one study involved an individual writing task based on corpus consultation (6). The last two tasks estimated to be at the advanced-high level required students to read online texts dealing with economics (12) and brain research (28). At the highest level, six of the projects, all of which involving graduate students, were based on writing assignments that obviously required superior proficiency: writing professional academic research papers (7, 23, 41, 47), technical reports (9), and translation commentaries (37).

Research Question 4: Do CALL materials in question improve AL2 learners' linguistic proficiency?

With regard to linguistic gains (i.e., proficiency), surprisingly, 19 of the 47 studies (40%) do not actually target learning outcomes. Instead, they describe effects of prior knowledge on technology use (16) communication and reading strategies (1, 2, 19, 26, 33), interactional patterns (25, 30, 40, 42, 44), tool evaluation (20, 24, 35, 36), CALL design/models (37, 38, 46), and attitudes about technology (22). Of the remaining 28 studies (60%) that do target learning outcomes, a very high 86% (24) claim that participants made significant improvements. Such claims, however, do not stand up well to close inspection. Firstly, in 3 (11%) of the studies (7, 18, 43) learning gains were determined uniquely on the basis of student self-evaluations. In another nine cases (38%) (5, 6, 9, 14, 15, 32, 34, 45, 47), although objectively-based on pre/post-test comparisons (with or without self-evaluations), the claimed results are questionable owing to unspecified or very low participation numbers and/or the short duration of the treatment. While there are no hard and fast rules for statistical results to be generalizable, for the purposes of this analysis it was judged reasonable to remove these nine from consideration since they either did not specify participant numbers or involved less than 10 students and/or lasted less than four weeks. Thus only 43% (12/28) (3, 4, 8, 17, 21, 23, 27, 28, 29, 31, 39, 41) of the studies that focus on learning outcomes involved a sufficient number of participants and treatment duration to be confidently regarded as demonstrating statistically significant improvements.

Research Question 5: What is the relationship between linguistic task difficulty and the proficiency level of the participants?

The relationship between linguistic task difficulty and the proficiency level of students affects CALL AL2 studies in two critical ways. Most generally, it reflects the appropriateness of pedagogical interventions. As learning theorists

have long recognized, for example in terms of $i + 1$ (Krashen, 1981) or Zone of Proximal Development (Vygotsky, 1978), it is essential that students undertake tasks that are difficult enough to challenge them but not so much as to be beyond their grasp. When the 28 studies that targeted learning outcomes are regarded from this perspective, well over a third (36%) fall outside of this range. A quarter of the studies engaged learners in tasks requiring less than their claimed proficiency level (4, 5, 6, 11, 27, 32, 34) and 11% (7, 14, 41) expected too much—probing at least two ACTFL sub-levels beyond. Excluding one study (21) that lacked sufficient information to determine task difficulty, only 17 (61%: 3, 8, 9, 10, 12, 13, 15, 17, 18, 23, 28, 29, 31, 39, 43, 45, 47) remain that can be said to engage learners in a task appropriate to their perceived level of competence (Figure 6).

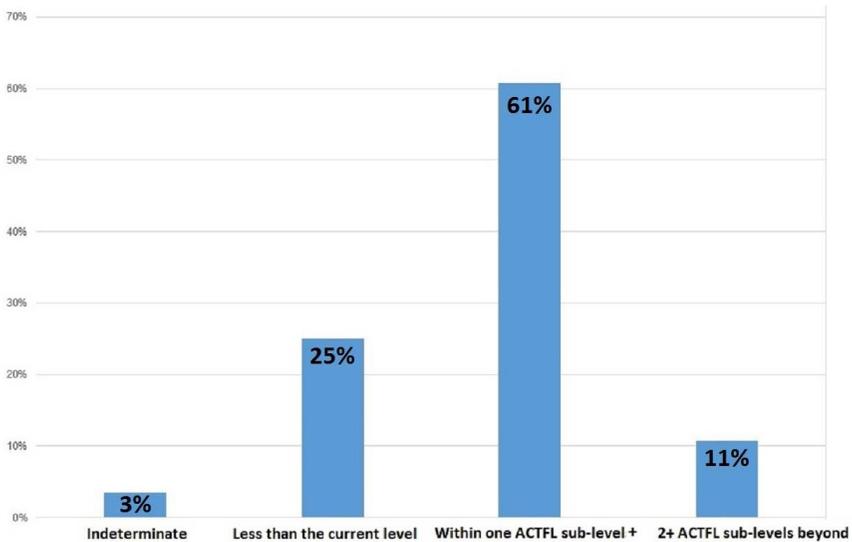


Figure 6: Task level appropriateness of learning outcomes

The second way in which linguistic task difficulty and student proficiency level affects CALL AL2 studies is in relation to the claimed learning gains discussed previously. Of the 24 studies that report successful learning outcomes, just half (3, 8, 9, 15, 17, 23, 28, 29, 31, 39, 45, 47) meet the criteria of generalizable objective measurement and are based on the completion of tasks appropriately scaffolded to the level of the participants. In sum, only about a quarter (12/47) of CALL AL2 studies report significant linguistic gains and satisfy the experimental design and pedagogical parameters to substantiate the results.

6. Discussion

The objective of this study was firstly to characterize what has been done in CALL research at the AL2 level. The data reveal that research in this area is extremely limited and of relatively recent origin, with only one study appearing before 2000. Although substantially more studies were undertaken in the US than elsewhere, nonetheless the published literature is very much worldwide in nature. That being said, the majority of studies (62%) focus on English as a second or foreign language. As with the languages targeted, so, too, their linguistic focus is extremely narrow, with 81% involving written communication. While reading and writing undoubtedly constitute essential aspects of advanced-level proficiency, spoken language fluency is no less important. Certainly aural-oral proficiency is a major component of the ACTFL Proficiency Guidelines. It is also a competency that motivates students themselves to pursue language studies beyond minimal graduation requirements (ACTFL, 2010, p. 1). Yet, in this meta-analysis just six studies are concerned with oral proficiency gains (four interpersonal speaking, one presentational speaking and one pronunciation correction), of which but one (31) presents statistically meaningful results.

Aside from quantitative and qualitative limitations, the studies examined here suffer from pervasive shortcomings in design and methodology. Despite an abundance of well-established proficiency descriptors, such as those of the Common European Framework (CEFR; Verhelst, Van Avermaet, Takala, Figueras, & North, 2009) and ACTFL, identification of learner competency levels is frequently vague and at times non-existent. From the outset, over a fifth of the studies had to be excluded from consideration for lack of adequate substantiation of the claimed proficiency level of students. So, too, among the studies retained for analysis, upon close inspection 20% of the learners were in all probability below the advanced-low threshold. Lack of clarity likewise affects the description of the tasks undertaken and the language competence required to successfully complete them. Needless to say, this begs a fundamental question about what CALL researchers and developers actually know about AL2. Arguably, this is not just a CALL problem, but also one that extends as well to SLA research in general. Not surprisingly, given the demonstrated lack of understanding about what constitutes advanced-level competence, analysis of the relationship between student proficiency and the linguistic difficulty level of assigned tasks reveals a significant mismatch in well over a third of the studies, most notably with students undertaking tasks below their claimed competence level a quarter of the time.

7. Conclusion

Contrary to what one might expect, concern with improved linguistic competence motivated only 60% of the AL2 CALL studies. While learning gains are

claimed in the vast majority of cases (86%), in reality only half of these substantiate improvements on the basis of tasks completed at an appropriate difficulty level and objectively generalizable assessments. With less than 3% of CALL publications in the study dealing with AL2, and of these only a quarter reporting reliably significant advanced-level learning gains, judging by the published literature it must be concluded that the contribution of CALL to the improvement of AL2 proficiency has indeed been negligible. Such a conclusion, brings to the fore the oft-repeated observation that instructional technology is only as good as its underlying pedagogy and methodological design. As Blake (2013) reminds us

Technology, *per se*, has no stake in any particular theoretical model or teaching methodology. The technology is theoretically and methodologically neutral. But how technology is used—its particular *culture of practice*—is **not** neutral; it responds to what the practitioners understand or *believe to be true* about SLA. (p. 12, emphasis in original)

As suggested above, the shortcomings of CALL research in regard to AL2 are very much linked to the neglect of advanced-level language competence within SLA research itself. Whatever the potential affordances CALL has to offer, and they are quite considerable, it is safe to say that any significant contribution it can make to our teaching of advanced-level languages must await the consistent incorporation of much more explicit proficiency descriptors and the application of much more rigorous research design criteria.

8. Limitations and Future Suggestions

The most obvious limitation of this meta-analysis is that its assessment of the contribution of CALL to AL2 learning gains is based on published research relating to instructional technology implementations as opposed to direct surveys of actual educational practices, and this through the lens of but four journals. Though the most internationally prominent, the latter account for only about half of the published CALL AL2 research. They are, however, broadly representative of the research published in North America and Europe and, moreover, describe implementations from around the world. It can, thus, be reasonably assumed that the evidence presented is broadly representative. Nonetheless, it would certainly be of benefit to complement the current database with AL2 studies from other CALL journals. So, too, there is a considerable body of CALL AL2 research in non-CALL journals, technical as well as non-technical, that could add to our understanding of the contribution of instructional technology to the teaching of advanced-level language. Conference proceedings, MA and PhD dissertations, and the occasional book, also

offer sources of CALL AL2 research that could be incorporated into a comprehensive study of CALL AL2.

The measurement of foreign language proficiency involves numerous pre-suppositions about what should be evaluated and by what means. The choice of ACTFL guidelines, and in particular the PD and CDS, as a reference point admittedly, and intentionally, biases assessment of learning outcomes in the direction of explicit qualitative descriptors and quantitative testing. On the other hand, their use is very widespread and their strengths and weaknesses well known, so they do have the considerable advantage of providing a commonly accepted yardstick.

A third, unavoidable, limitation of this study is the extent to which it has had to rely upon its authors' interpretation of critical research parameters, especially the linguistic competence of students and difficulty level of assigned tasks. In every case, the researchers were able to agree on how key words and descriptions from the study matched ACTFL criteria; however, not a single study used such standardized descriptors this way to design their project.

Looking to the future, much can be done to further our understanding of advanced-level language learning and how CALL can contribute to attaining AL2 proficiency. Firstly, studies need to increase the number of languages targeted and expand the range of linguistic focus to include a much larger proportion of aural-oral skills. Likewise, the number of participants and duration of treatment in these studies needs to be expanded to provide a basis for meaningful statistical analysis. However, this cannot be approached by simply continuing to do more of the same old thing. CALL researchers and developers need to take account of the larger theoretical and methodological/pedagogical contexts that underpin any effect between instructional technology and language development. The same rigor implemented for data analysis must also be used when explaining and justifying the level of the participants in question and the expectations and benchmarks for the task being implemented. AL2 studies need to substantiate the pre-treatment competence level of participants according to some explicit evaluation metric. It does not suffice to simply refer to learners as "advanced" when well-established external criteria exist, such as the ACTFL and CEFR scales, that can better characterize where learners are within the vast advanced proficiency continuum. AL2 studies must define and align task difficulty with the targeted competence level of participants. NCSSFL-ACTFL (ACTFL, 2015b) and ALTE (the Association of Language Testers in Europe) - CEFR (ALTE, 2002) "Can Do" statements provide a framework for language tasks that could be used as tangible measures for assessment purposes to better pinpoint areas of linguistic growth. So too, if CALL is to contribute to improved proficiency gains, serious attention needs to be paid to documenting objectively measurable learning outcomes.

Finally, and no less importantly, if they are to foster advanced-level proficiency, CALL implementations need to become more innovative in their exploitation of instructional technology and more comprehensive in their pedagogical approach. Mobile devices and cloud-based technologies provide ubiquitous access that allow learning to take place in real-world or life-like contexts conducive of advanced-level language performance. These resources need to be used to support extensive task-based activities, e.g., role-playing, that require students to actualize the full range of “can-do” linguistic performance that defines advanced-level competence.

Note

1. Other proficiency scales, such as the Common European Framework (CEFR) exist as well and their use as a reference point would have been equally possible. The selection of ACTFL was motivated by the authors’ greater familiarity with its scales.

About the Authors

Jack Burston (PhD) holds the position of Honorary Research Fellow in the Language Centre of the Cyprus University of Technology. He is a language-teaching specialist with a formal background in theoretical and applied linguistics and second language acquisition and testing. He also has considerable expertise in computer-assisted language learning, foreign language software evaluation, language center design, and professional faculty development. His current research is focused on mobile-assisted language learning. Jack was a member of the editorial board of the *CALICO Journal* for 18 years, served as software review editor of the *CALICO Journal* for 13 years, and is a former member and former chair of the CALICO executive board.

Kelly Arispe (PhD) is an Assistant Professor at Boise State University, where she teaches upper-division Spanish courses with an emphasis on Hispanic linguistics. She is also the program coordinator for French, German, and Spanish teacher education candidates. Her research is in second language development and computer assisted language learning, specifically as it relates to advanced language learners. She is a certified oral proficiency examiner by the American Council of Foreign Language Teaching, and her research and praxis has recently stemmed from the intersection of standards-based practices and the implementation of mobile technologies at the advanced level.

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