

Technology and Language Learning Research in *English Teaching*: Critical Reflections and Future Directions

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The purpose of this study is to summarize and report on both academic and pedagogical implications of CALL studies published in *English Teaching* from Vol. 1 (1965) to Vol. 70, n. 2 (2015) by critically reviewing 118 CALL articles in a qualitative meta-analytic approach, and also to suggest future directions for CALL research and practice. The data analysis indicates that *English Teaching* has made significant achievements in developing technology and language learning research from both quantity and quality standpoints. First, that CALL has been consistently discussed as a major topic. Second, the research has been ground-breaking in topics, technologies, and instructional approaches. Third, the studies have produced meaningful findings, practical suggestions, and positive conclusions for English education in Korea. On the other hand, there are also some neglected aspects: first, the primary concern has been mostly for the effectiveness of new technology by means of quantitative approaches; second, the study scope is limited; third, the research projects are not sustainable or are unsupported by follow-up studies. In the future of CALL, it is hoped that 1) the role and usage of technology will be studied more from the L2 perspective; 2) the target interest will be focused on normal curricula; 3) large-scale research will be better promoted; and 4) more international efforts will be undertaken for theory building.

Key words: Computer-Assisted Language Learning (CALL), technology, Information and Communication Technology (ICT), qualitative meta-analysis, *English Teaching*, Korea

1. INTRODUCTION

Technology has been one of the major topics in *English Teaching* for 50 years. The

Korea Association of Teachers of English (KATE) was formerly the University Language Laboratory Association of Korea (ULLA), an academic community which focused largely on the role of technology in language learning and instruction. In fact, in the 1960s, the early issues of the journal were full of an experimental spirit and optimistic expectation toward language lab technology, and this keen interest in up-to-date technologies has continued into the present in *English Teaching*.

The use of technology for language learning has been defined as one academic area of TESOL in the name of Computer-Assisted Language Learning (CALL) (Levy, 1997; Wyatt, 1984). The term CALL was first introduced to *English Teaching* readers by Patterson (1988), who used the term while suggesting three dynamic and innovative roles for microcomputers in CALL. He also insists that Korean educational institutions should certainly utilize computer systems, but this CALL process “must be cultivated carefully, creatively, and systematically if it is going to succeed so that it does not become a victim that is similar to what happened to the language laboratory” (p. 201). Considering that it was 1984 when the academic term CALL first called by Wyatt, Patterson’s article was cutting-edge.

It is also noteworthy that over the last fifty years in the same journal, 118 CALL research articles have been published, and that 97 scholars have participated in these research projects. What then have the CALL studies in *English Teaching* found for second language learning so far? What have they achieved and missed about CALL in Korea? This would be an ideal time to look into this by reflecting on the 50 years of Korean CALL research.

Therefore, the purpose of this study is to summarize and report both academic and pedagogical implications of CALL studies published in *English Teaching* from Vol. 1 (1965) to Vol. 70, n. 2 (2015), by critically reviewing the 118 CALL articles in a qualitative meta-analysis approach. This study intends to suggest the future direction of CALL research and practice. The following research questions framed this study:

1. What are the features of the 118 CALL research articles published in *English Teaching*?
2. What has been achieved and missed in the previous CALL studies from the L2 research and practice viewpoint?
3. In what areas are more emphasis and effort needed in developing Korean CALL research and practice in the future?

Current technology means networked computers, e.g., information and communication technology (ICT). In this study, however, the term CALL research is used for all studies using technology of any type from cassette players to mobile devices.

2. RESEARCH METHOD: QUALITATIVE META-ANALYSIS

This study employs a qualitative meta-analysis approach technique (Rogers, 1981; Witkin, 1990). Rogers (1981) argues that qualitative meta-analysis relies on descriptive narratives to explain the research findings and attempts to synthesize the verbal conclusions of the primary research instead of the original quantitative data. Based on Rogers' (1981) guidelines, the procedure of the analysis of this study can be summarized as follows.

2.1. Primary Sources

This study searched and selected 118 CALL studies from Vol. 1 (1965) to Vol.70, n.2 (2015) as primary sources, as displayed in Table 1.

TABLE 1
Distribution of the Target CALL Research Articles

Period	1965- 1970	1971- 1980	1981- 1990	1991- 2000	2001- 2010	2011- 2015	Total
<i>N</i>	13	8	13	28	43	13	118

They were filtered according to the following criteria. First, all the studies in which the technology use is the primary concern for learning and teaching English were selected. If some technology was involved, but not directly for English educational purposes, for instance, linguistic analysis using corpora, such studies were not included. Second, all types of technology, not just computers, were considered, from cassette players to mobile devices. In general, technologies like videos, broadcast media, or captioned TV cannot be categorized as computer technology, but in this study they are also referred to CALL research for the sake of convenience. Third, not only full-blown research such as experiments or empirical data-based studies, but also literature reviews, reports, or position papers, were included in the primary sources of this study if they contained sufficient information or argument. This is because recent educational research methodology was not yet developed and applied in the 1960s-80s.

2.2. Data Analysis

Drawing from Rogers (1981), this study intends to “define the unit of analysis in the smallest terms possible” and to analyze “as many qualities of the primary research as possible” (p. 18). This study first determined the analytical units as in Table 2 in view of

the research questions. Seven categories emerged, and each category has the following small units for data coding.

TABLE 2
Analytical Units for Data Coding

Categories	Units
Keywords	- Frequency - Qualitative review
Skills	- Whole (4 skills) - Individual target skills (speaking, writing, reading, listening, vocabulary, grammar, culture, etc.)
Technology used	- AV lab, video, TV, CCTV - PC program (word processors, programs) - websites - CMC (email, BBS, chat, videoconferencing, SNS) - CD-ROM (courseware, target skills) - corpus/concordance - web 2.0 tools - mobile (PDA, Smartphone, SMS)
Participants	- Age (elementary, middle, high, college, teacher) - Number of subjects
Research method	- Length of treatment (week, month, semester, year) - Genre (report, introduction, review, positioned paper, research) - Research method (quantitative, qualitative, mixed) - Experimental design (pre-post, A vs. B (vs. C), computer vs. no computer, transferability)
Study Purpose	- CALL Effect - Lesson design - Discourse analysis - Teacher/student variables - Theory reviews - Critiques/ suggestions - Case report - Intro of updated information
Context	- School, out of school - Individual, group

Each article was then carefully reviewed and coded in a spreadsheet program based on the analytical framework. For further in-depth analysis, this study used various charts, tables, and figures. Purposes and study findings were then qualitatively reviewed for repeated themes. Categories and units were carefully reviewed and revised by comparing internationally distinguished CALL journals such as *CALICO* or *Computer-Assisted Language Learning*.

3. HISTORICAL SKETCH OF CALL RESEARCH IN *ENGLISH TEACHING*

It is necessary to view the previous studies chronologically in understanding how they have changed or developed and where they can be placed globally. In this section, *English Teaching* is sometimes compared with *TESOL Quarterly (TQ)*, a prestigious international TESOL journal that was founded in the same general period as *English Teaching*.

3.1. 1960-70's: The Effect of Language Labs

In this period, for the aforementioned foundational purpose, all the published papers dealt with language labs in terms of lab effects, problems, operational knowhow, and international trends. In the first issue, three articles were published on language labs, introducing facilities and functions of labs, effective lab lessons, and a college pilot project (Cha, 1965; Underwood, 1965; Yoo, 1965). Up to volume 20 (August, 1980), eighteen CALL articles (discussions, position papers, case reports, etc.) had been published, and all deal with language learning labs. Although several issues are discussed, the authors take the same position as follows. They argue for caution toward unrealistic expectations on of the lab system and technologies. Many studies also indicate that lab materials and instruction guides are urgently needed. They also argue that listening, speaking, and pronunciation should be more emphasized in college English.

The results show that the topics and arguments of the journal followed global trends of the time. For example, the topic of technology use was first discussed in *TQ* in 1968 (Vol. 2. n.1), two years later than in *English Teaching*. The article, "The application of audio-lingual technology to beginning reading" recommends a mini *lab* (cassette tapes, recorders and headphones) and an audio-lingual method for young L2 readers (King & King, 1968). The language lab issue also continued in *TQ* till the end of the 1970s (Farnsworth, 1974; So, 1974; Taylor, 1979), although only a few such articles were published.

3.2. 1980's: Broadcast Media & Videos

In the 1980s a language lab still remained as one of the main issues, but focusing more on *how* to utilize the system more effectively (Bae, 1981, 1982; Harvey, 1981; J.-W. Kim, 1982; S.-B. Kim, 1982). Bae (1982) provides more specific suggestions on materials for a more communicative college lab lesson by criticising the lab exercises of that time. Bae (1982) also categorizes lab lessons into four different types: the economic lab, monitored lab, combined lab, and individual lab, and suggests relevant materials for each.

Meanwhile, another new topic was English broadcasts. In those days, radio broadcasting

companies produced many English conversation programs, which were fresh and popular speaking and listening lessons to the audience. Kang (1980) reviews a KBS radio program, "Live English Conversation," based on an analysis of content and a survey. Park (1980) also critically evaluates English broadcast programs in terms of the role and content for language learning, and suggests some practical and pedagogical ideas for improving them. Y.-S. Lee (1982) also argues for the effectiveness and economy of using broadcasting networks, including radio, TV, CCTV and audio systems to provide listening comprehension tests.

After the mid-eighties videos had begun to be considered as an effective learning medium. If early 1980s media are mainly aural such as radios or cassette players, the discussion in the late 1980s focuses on visual technology such as colour TV and videos. This change seems critical because technology was brought inside language classrooms, while considering radio or language labs generally as individual practice outside the English class. Hwang (1986) and Bauer (1988) suggest some instructional ideas on how to use videos in English class. The term *multimedia* is first introduced in this period, meaning 'using various media sources in an integrated way' (Hwang, 1986), which concept is slightly different from than these days.

In the 1980s only a few CALL articles are found in *TQ*. Broadcast English attracted some research in the late 1970s (Brinton & Gaskill, 1978; Handscombe, 1975; Parish, 1976), but was not developed further. As in *English Teaching*, radio, TV, and videos are mainly discussed as technologies for L2 learning and teaching in this period. The new approach, CALL, was introduced in the late 1980s by Chapelle and Jamieson (1986, Vol. 20 n.1), which is two years earlier than in *English Teaching* (Patterson, 1988).

3.3. 1990's: The Advent of Computer & Multimedia

In the 1990s the era of digital technology had begun with the advent of computers, and also the use of technology had become not an instructional example, but an approach or theoretically defined area of Computer-Assisted Language Learning (CALL). After briefly introducing the term in 1988, two articles in Volume 42 (summer, 1991) ignite the discussion. I.-C. Choi (1991) introduces CALL as an independent scope of second language learning in his paper, "The status and prospects of CALL." His article includes comprehensive and systematic reference of CALL from history to up-to-date technologies and their related functions for language learning. Choi argues for the need for CALL courses in graduate programs so that CALL specialists can train teachers and develop language learning programs. Ahn (1991) also introduces computers and PC-based OS programs as potential language learning tools.

Later, many articles introduce CALL materials such as courseware, CD-ROMs,

software tools according to language skills (S.-Y. Choi, 1993, 1994), and CALL methodologies (Kang, 1993; Park, 1994). The first experimental studies are published by S.-B. Kim (1996) and S.-Y. Choi (1996) at the same time (Vol. 51). Kim conducts an experiment with 96 college students by using CD-ROM in an English class for two weeks to investigate the effectiveness of the courseware. She compares a CD-ROM group and no-CD-ROM group treated by two different levels of classroom language, English only and Korean and English mixed. The ANOVA analysis shows a significant difference between CD-ROM vs. no CD-ROM groups, but no difference between the teacher's language levels. Choi's (1996) experimental design is also very similar to Kim's (1996), but with 188 high school students for a much longer period, two semesters. Three treatment groups, a one-semester CD-ROM study, a two-semester CD-ROM study, and a no CD-ROM study, also show significant differences, implying that the CALL effect becomes greater with longitudinal use of courseware. Subsequently, full-blown CALL studies are published, extending topics such as pronunciation training (Y.-H. Choi, 1997) and task strategies (Han, 1998).

Globally, the 1990s are the booming period in CALL, and two journals, *Computer-Assisted Language Learning* and *Language Learning and Technology* are founded. Furthermore, *TQ* deals with leading research articles only, but no more techniques or instructional suggestions. Not many CALL articles are published in this period. Chapelle (1998) and Warschauer (1998a) discuss CALL research issues and future directions. Chapelle (1998) argues that CALL research should attend to learners' engagement in CALL activities by checking negotiation of meaning in their interaction pattern. On the other hand, Warschauer (1998a) criticizes the *determinist* perspective, where much early CALL research seeks to investigate the general effect of the computer and suggests a *critical* theory of technology.

3.4. 2000's: The World Wide Web and CMC

The first decade of the 2000s seems to be the second most flourishing period of CALL research in *English Teaching* after the first fruitful 1960s-1970s. Forty-three CALL articles are published in this period. It seems true that the emergence of the World Wide Web drove insights among L2 educators and shed light on enhancing communicative language teaching. Since Byung-min Lee (1996) first introduces the role of the internet in language learning for enhancing authenticity and communication, numerous web projects are attempted in elementary schools (Kang, Sung, Park & Ahn, 2009; J.-R. Kim, 2003; Kim & Choi, 2006), secondary schools (Choi & Kang, 2002), and universities (Busbee, 2001b, 2002; Cho, 2001; Sung, 2005).

The target language learning variables of the studies also vary from integrated four skills

(Choi & Kang 2002; Han, 2002; Kim & Choi, 2006; Sung, 2005), to listening (Yoo & Lee, 2002), speaking (Chang, 2003; Hwang, 2008; Jung & Chun, 2007; S. Kim, 2003), reading (Busbee, 2001b; J.-R. Kim, 2003; D.-H. Lee, 2004; S.-Y. Lee, 2004), writing (Busbee 2002; Cho, 2002; Choi, 2007; Kim & Chun, 2008; Lee, 2009), vocabulary (Choi & Kim, 2006; Miles & Kwon, 2008), strategies (Han, 2002) and also critical thinking (Chu, 2007). Teacher and learner variables are also explored (Jung, 2001; H. Kim, 2002; Shim, 2007; Yim, 2007)

Furthermore, these studies attempt a far greater variety of research design and methodologies. Whereas the 1990s research is entirely quantitative, using descriptive or analytical statistics, there are some attempts at new L2 research methodologies. The first qualitative research is undertaken by H. Kim (2002). She observed and interviewed three ESL teachers who utilized the Internet for their instruction for one semester to ascertain their beliefs and attitudes toward CALL. There are also many studies whose major data analysis method is discourse analysis (Cho, 2008, 2009; Chu, 2007, Koh, 2007, 2008; D.-M. Lee, 2004; Shim, 2007; Yim, 2007). The extension of research focus and design is well supported by the aforementioned research direction indicated by Chapelle (1998) and Warschauer (1998a).

It is particularly noteworthy that a substantial portion of CALL studies in the early 2000s focus on Computer-Mediated Communication (CMC). Many scholars are interested in communication or conversation patterns in asynchronous (email, discussion board) and synchronous (chat room, instant messages) online interaction. The first CMC study was carried out by Han (2002). She investigated students' speaking and listening ability and affective aspects in learning English after using an online listening material and a voice board. After Han's (2002) study it is remarkable that 17 CMC studies had been published in the same period, including Chang (2003), Hong (2003), J.-R. Kim (2003), S.-Y. Kim (2003), Koh (2007), Shim (2007) and Yim (2007).

The popularity of CMC is similarly shown in *TQ*. Three CALL articles in Vol. 34 n. 3 (2000) are all about CMC (Kamhi-Stein, 2000; Lam, 2000; Murray, 2000). Not only CMC, but some more fresh topics are also addressed in *TQ* such as using corpora (O'Keeffe & Farr, 2003), multimodality (Royce, 2002), and curricular reform (Fang & Warschauer, 2004).

3.5. 2010s: Mobile-Assisted Language Learning

For the last five years, fifteen articles have discussed digital technology and language learning, which seems to be a rather lower publication rate compared with other periods. However, globally, the CALL trend is dramatically changing due to the recent popularity of mobile technology, and mobile-assisted language learning (MALL), social networking

service (SNS) and multimodality (Hafner, 2013) are now heated issues internationally under this category in TESOL.

In *English Teaching*, Choi and Kim (2006) had already brought up the idea of using mobile technology for language learning with their five-week application data with 40 college students. However, no further discussion continues for years before Kang, Sung, Park, and Ahn's (2009) e-learning vs. m-learning study. They aim to compare two student groups studied in different types of blended systems (PC vs. mobile) at a private institute. After investigating pre-post test scores of four language skills individually and by proficiency levels between an e-learning group (5,477) and an m-learning group (1,997), it is concluded that m-learning is more effective than e-learning in developing communicative competence. Most recently, Lawrence (2015) conducted a survey to examine learner receptiveness toward using smartphones to enhance EFL with 159 Korean college students. Meanwhile, according to the RISS database (searched August 13, 2015) 48 MALL research papers were published in Korea after the year 2000, so this publication number (4) is unexpectedly small in a nationally leading journal. Also in *TQ* mobile-assisted language learning has not yet been fully discussed.

4. GENERAL OVERVIEW OF CALL STUDIES IN *ENGLISH TEACHING*

As indicated earlier, *English Teaching* published 118 CALL articles over the last fifty years. The data analysis reveals that 8.2% of all published articles (1,428 papers¹) discuss technology use for language learning. Table 3 shows the number and ratio of CALL research in *English Teaching* every five years for a better understanding.

TABLE 3
Number and Rate of CALL Articles in *English Teaching* over 50 Years

Range	1965- 1970	1970- 1975	1976- 1980	1981- 1985	1986- 1990	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	Total Number
CALL Articles	13	3	5	8	5	7	21	21	22	13	118
Total Articles	25	30	79	108	79	133	237	307	253	177	1428
%	52	10	6	7	6	5	8	7	8	6	8.2 ^a

Note. ^a The mean percentage across ranges.

¹ The total number can be counted differently depending on how the articles in the 1960s are categorized.

FIGURE 1

Number of CALL Articles vs. Total Articles Published in *English Teaching* per Five Years

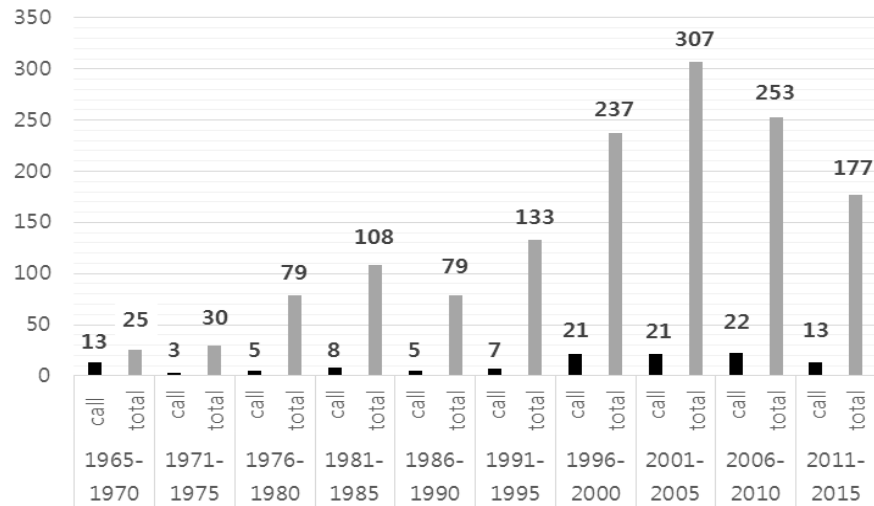


Figure 1 above explains Table 3 more clearly. In the 1960s more than half the published papers (52%) concern language laboratories due to the founding motivation of the association (ULLA), and the topic interest lasts for a few decades. After the first 10 years, the language lab issue is no longer discussed, so from 1976 to 2015 for 40 years the average rate of CALL articles in *English teaching* is 6.6%.

4.1. Target Skill Areas

Many of the CALL studies are targeted at improving particular language skills by using technology. According to Table 4, 31 studies aim to investigate the effect of technology in enhancing whole language or all four language skills together at once. However, many other studies are interested in one or two particular language skills such as listening or listening and speaking.

TABLE 4
Number and Ratio of Target Skill Areas Explored in CALL Articles

Areas	Target Skills	All 4 Skills	Total	%
Listening	16	31	47	22.0
Speaking	20	31	51	23.9
Reading	23	31	55	25.2
Writing	8	0	8	3.7
Grammar	4	0	4	1.8
Total	90	124	214	100.0

As shown in Table 4, listening, speaking reading and writing skills are almost equally discussed. The most frequently explored area is writing (55 articles, 25.2%), reading and speaking are exactly the same (51 articles, 24%), and the next is listening (47 articles, 22%). Vocabulary and grammar skills constitute a much smaller portion, 3.7% and 1.8%, respectively.

4.2. Technology Use

The technology explored in the CALL studies has changed over time. From the analysis of keywords and abstracts, Table 5 shows the most commonly reviewed technology by decade.

TABLE 5
Most Commonly Investigated Technologies per Decade

Years	1960–1970	1980	1990	2000	2010
1 st	Language lab	Language lab	Personal computer	World Wide Web	Videoconference programs
2 nd	none	Broadcast (Radio, TV)	CD-ROM	Chat room	web applications

In the 1960s and 1970s, the most popular technology is the language lab. The popularity continues in the 1980s along with broadcasts such as radio and TV. In the 1990s the emergence of personal computers attracts L2 scholars and some imported ESL CD-ROM applications are reviewed and investigated. The World Wide Web is the greatest CALL issue in the 2000s, and online chat rooms are the second common topic for 10 years in *English Teaching*. For the most recent 15 years, in the 2010s, many studies have been interested in the effect or the discourse patterns of videoconference programs or applications such as smartphone apps.

4.3. Keywords

Since keywords are provided by the journal as of 2001 (Vol. 56 n.1), 204 words were collected. Table 6 presents the most frequently used keywords. The most frequently appearing word was ‘learning’ (24 times), but this word is not specific and can be part of a phrase with another content word such as ‘collaborative,’ or ‘web-based teaching.’ The second most frequent word was CMC, which appeared 17 times. This in fact seems to be

TABLE 6
Most Frequently Used Keywords (2001-2015)

Ranking	Times	Keywords
1	21	Learning
2	17	CMC
3	12	Writing
4	11	CALL
4	11	Teacher(teaching)
6	10	Online
7	8	Feedback
7	8	MALL (Multimedia-Assisted Language Learning)
7	8	Corpus (corpora, concordance, concordancers, concordancing)
10	7	Mobile (m-learning, Smartphones)
11	6	Interaction
11	6	Chat (chatting)
13	5	Video
13	5	Negotiation

the most popular topic for the last 15 years, implying that at least 17 studies focus on English communication online, particularly, conversation patterns in CMC contexts.

4.4. Target Age Group and Technology by Context

The great majority of CALL research studies are conducted in college context. In general, the researcher has applied computer-assisted instruction to college English or with college students in an English (or English education) department. Table 7 shows information on target age groups and technology use contexts.

TABLE 7
Distribution of Target Age Group and Technology Use Context

Variables	Contexts	<i>N</i>	%
Target age groups	College	65	64.4
	High School	7	6.9
	Middle School	10	9.9
	Elementary School	6	5.9
	Teachers	13	12.9
Technology use context	School	33	37.9
	Out of School	54	62.0

The largest target age group is college (65 articles, 64.4%), 17 articles for middle or high school (16.8%), and 6 articles for elementary levels (5.9%). Thus, about 87% of the CALL articles that generated empirical data with the participants are studied from the learner's perspective. Only 12.9% of them focus on teachers or their instruction.

Meanwhile, the projects are mainly managed out-of-school contexts, running a short-

term extra class or with a small group of individual students. Only 33 CALL projects (37.9%) are conducted in school (in class or regular lessons), while the other majority contexts are out of school (54 articles, 62%).

4.5. Research Purposes

The purpose of the research varies in the CALL studies. As shown in Table 2, the qualitative meta-analysis generates seven units in the ‘study purpose’ categories shown in Table 8.

TABLE 8
Purposes of CALL Studies

Design	Purpose	<i>N</i>	%	Total
Data Analysis	Call effect	28	23.3	44.1
	Lesson design	1	0.8	
	Discourse analysis	18	15.0	
	Teacher/student variable	6	5.0	
Description (No data analysis)	Theory review	5	4.0	56.4
	Introduction (case report)	38	31.6	
	Discussion (suggestion, critique)	24	20.8	
Total		118	100.5	100.5

TABLE 9
Research Designs for Investigating Effects of Technology

Design	CALL vs. no CALL	A vs. B	Before vs. After CALL	Transferability	Total
<i>N</i>	7	5	10	3	28
%	25	18	46	11	100

The most frequently appearing purpose is ‘introduction.’ The research was conducted in order to introduce new information (up-to-date technology or recent approaches) or a case report. Since technology has changed rapidly and remarkably, information on new technology from the L2 perspective should be provided. Therefore, articles written for introducing technology are the most (38 articles, 31.6%).

Second, many studies (28 articles, 23.3%, the second largest group) aim to investigate ‘technology effects.’ In order to determine the effects of CALL, many researches (10 articles, 46%) check the effectiveness of language learning after using technology mostly by comparing the difference between ‘before (pre-) and after (post-tests) CALL’. Another common method is comparison between ‘computer vs. no computer’ treatments (7 articles, 25%). Similarly, some studies (5 articles, 18%) compare ‘A vs. B’ or two different types (levels)’ of technology (use) such as synchronous CMC vs. asynchronous CMC. Lastly,

three articles (11%) show interest in the transferability of CMC to speaking ability.

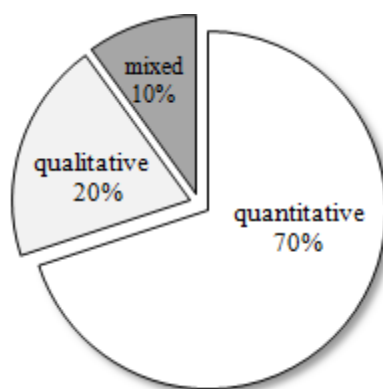
The third most common purpose is to offer critiques or arguments regarding the use of technology for language learning (24 articles, 20.8 %), according to Table 8. Sometimes these studies raise hot issues and include brief questionnaires. The articles for this purpose are found mostly in the early issues. Fourth, from the year 2000, many studies analyse conversation or discourse patterns in various CMC contexts such as chatting or instant messaging to ascertain their unique characteristics or similarities with face-to-face communication (FFC). Also, a small number of studies were found for teacher/student variables (6 articles) such as barriers, beliefs or anxiety, discussing theory reviews (5 articles) or providing a lesson design (one articles).

Further in-depth analysis indicates that more than the half of the published CALL articles (67 articles, 56.4%) in *English Teaching* do not contain empirical data, but only descriptions or arguments, while 53 articles (44.1%) provide some empirical data. This seems to be a very different characteristic of CALL research than in other L2 research areas.

4.6. Research Methods

For research methods, the CALL publications show no variety. The overwhelming majority of the studies (70%) employ quantitative approaches; only 20% can be categorised as qualitative. Ten percent are mixed designs in which qualitative data are partly introduced to reinforce the statistical findings, as displayed in Figure 2.

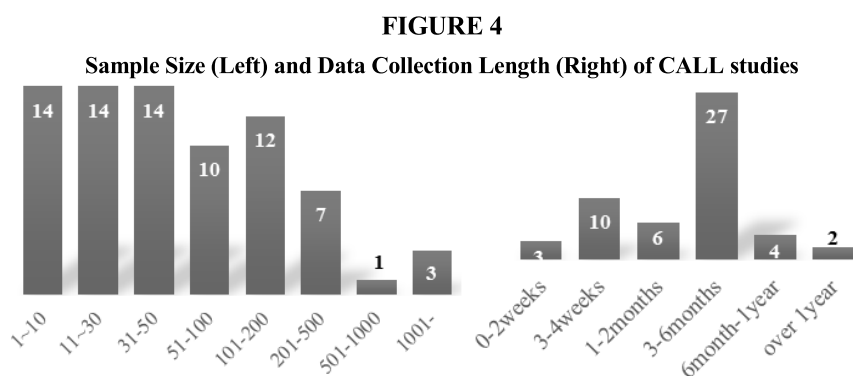
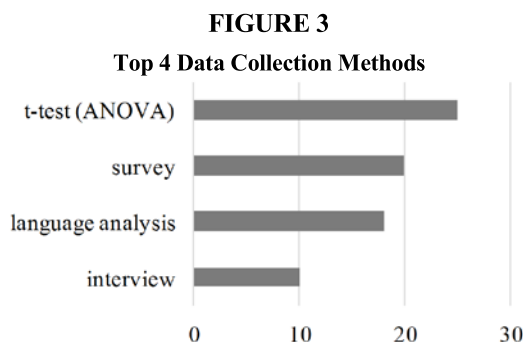
FIGURE 2
Distribution of Research Methods in CALL



Moreover, the data collection methods in their research designs are not very diverse.

Four methods, t-tests (ANOVA), surveys, discourse analysis, and interviews are used by almost all studies. Figure 3 shows the frequency and ranking of the data collection methods used in the studies.

The sample size of the studies is not very large. This seems not surprising in the micro educational research setting because the target sample units are usually classes or individual learner groups. As shown in Figure 4, 42 articles (out of 75, or 56%) investigate less than fifty subjects, not at all a powerful size for generalization from statistical analysis. It seems that because CALL studies generally intend to take up a new challenge to the current unfavourable environment, it must be harder than for other L2 studies to collect larger data samples from regular school settings. The study that provided the largest scale data is Kang et al.'s (2009) study. They compared two groups of L2 learners, consisting of 5,477 and 1,997 elementary school students.



The length of CALL treatments also vary from 24 hours to 4 semesters, but 3-6 months are the most frequently used research design, as in Figure 4 (right). The reason for this very short data collection period seems similar to that of the small sample sizes. Only a few studies extended their application to more than one semester.

5. CRITICAL LOOK AT CALL RESEARCH FINDINGS

5.1. What Has Been Achieved

As discussed so far, there seems no question that *English Teaching* has made noteworthy achievements in developing technology and language learning research from both quantity and quality standpoints. It would be no exaggeration that *English Teaching* has kept abreast of other world leading TESOL journals in the CALL area. Based on the analysis of data discussed in this study, the significance of these achievements can be summarized as follows.

First, CALL has been consistently discussed as a major topic in *English Teaching* for the last 50 years. The fact that on average, 8% of all published articles are about CALL demonstrates this. The number of articles (118) and authors (97) also implies marked a contribution of CALL research to the journal.

Second, the research has been ground-breaking in terms of topics, technologies, and instructional approaches. As discussed, once a new technology emerged or a new theory and practice became a topic of international discussion, the journal rapidly took up the discussion. Concepts or topics such as language laboratories (Cha, 1965; Underwood, 1965; Yoo, 1965), CALL (Patterson, 1988), CMC (Han, 2002), and mobile learning (Choi & Kim, 2006) were discussed almost immediately after they were first introduced.

Third, the studies produced meaningful findings, practical suggestions, and positive conclusions for English education in Korea. Twenty-eight studies proved with reliable data targeting various skill areas (Table 4) the significant effectiveness of teaching English with technology. Also, 38 articles provide new CALL information and hands-on guides with examples. Furthermore, except for some studies (e.g., Busbee, 2001a), the CALL studies mostly provide positive conclusions that technology enhances learners' motivation and language skills, so that educators and policy makers could be encouraged to integrate ICT into English curricula.

5.2. What Has Been Missed

On the other hand, it is also found that some aspects that CALL studies in *English Teaching* have been overlooked or ignored. This study intends to critically indicate several weaknesses.

5.2.1. Are computers effective?

For several decades, since many new technologies were invented, the CALL concern

has always been ‘What is it?’ or ‘Is it good for language learning?’ Thus, CALL articles in *English Teaching* also show primary interest in the effectiveness of new technology. As indicated in Table 8 and Figure 2, the majority of empirical data-based research (28 out of 53, or 53%) intended to investigate the effectiveness of computers by means of t-tests or ANOVAs.

However, early on, Warschauer (1998a) warned against a determinist approach in CALL research that investigates the overall effect of the computer in language learning. He contends that computers do not constitute a method, so the computer effect should be explained in a particular context or with a method used in an experiment. Similarly, Chapelle (1997, 2001) also indicates that what should be evaluated is not the computer, but the quality of CALL activities, which means language and language experiences which learners engage in during CALL tasks. Therefore, instead of questioning the effects of digital devices, the ways in which a program, by whom, in what contexts, and for what purpose should be examined (Kern, 2006).

There were only a few qualitative research studies where the language learning context, application process, or participants were thoroughly monitored and described. In fact, compared with all the positive results of the studies, ICT was not successfully and consistently integrated into the curriculum in any school levels in Korea. There has not been much concern about ‘what is the reason?’ ‘What’s the barrier?’ and ‘What are the possible solutions?’

5.2.2. Limited research scope

The data analysis also finds that the scope of the CALL studies is limited in many facets. For this reason an assumption can be made that the CALL research findings in *English Teaching* might not be of great help for educators to apply ICT into real classrooms.

First of all, there are no sufficient data from any level of public schools, as Table 7 shows that 64% of the CALL research has been conducted with college students. Moreover, their technology use was usually out of class (62%) and with small groups, with less than one or two class size per study (Figure 4). Only a few studies attempt to develop or evaluate ICT-integrated school curricula or instructional programs. This is seemingly because universities are comparatively easier for researchers (college professors) to access, and also because large-scale sampling or curriculum development requires a sizeable budget, time and effort. Therefore, unfortunately, the findings so far are not likely to yield a significant impact on English classes in Korean schools.

Second, teacher variables or teacher training issues were not discussed much. Only thirteen studies deal with teachers in CALL. However, success depends on teachers in

initiating new ICT lessons and CALL approaches (Hurley & Mundy, 1997; H. Kim, 2002). Without teachers' sufficient knowledge and positive attitudes, CALL cannot be successfully sustained. Most of all, only a few CALL studies provide information regarding English teachers' needs in teaching in a technology-enhanced environment.

Lastly, there exists no policy research in CALL. Since technology is costly, whether to use computers or mobile devices cannot be determined by individual students or teachers. Furthermore, nation-wide CALL projects such as cyber home schooling, digital textbooks, computer-based language tests, and mobile applications require fundamental research prior to large-scale investments. However, there exists no large-scale needs analysis or other basic studies of education policy.

5.2.3. Lack of sustainability

The research inquiries or discussions in the studies have not contributed to substantive conclusions. Data were gathered mostly for short time periods, most frequently 3-6 months, as in Figure 3, which is certainly not sufficient time to investigate the actual effects of CALL. In addition, only a few follow-up studies (Cho, 2008, 2009; Chung, 2010, 2012) replicate the same research design, or discuss the research questions of the previous studies. Therefore, unfortunately, CALL projects or cases ceased as a one-time event or a pilot trial. However, the novelty effect has been cautioned against, particularly in adopting new technology (Krendl & Broihier, 1991), and solid research findings can be yielded by means of longitudinal and repeated application.

CALL sustainability can be achieved by considering both technological and pedagogical concerns (Kim, 2015; Ng & Nicholas, 2013). According to Ng and Nicholas (2013), technological sustainability is improved by selecting appropriate technology that can satisfy institutional or individual needs and goals for a substantial period of time, and pedagogical sustainability requires teaching/learning practices that support the long-term goals of the program.

6. FUTURE DIRECTIONS

Richard Kern (2006), in the *TESOL Quarterly* 40- year-celebration issue (Vol. 40, n.1), questions whether CALL still should be called 'CALL' because using a computer for learning is so natural and normal. He repeats Warschauer's (1998c) statement that there is no such term as PALL (pen-assisted language learning) or BALL (book-assisted language learning). However, if normalisation (Bax, 2003) is an end goal of CALL, I believe that CALL still needs to be called CALL, because the current reality of CALL research and

practice is quite far from normalisation. For moving forward to sustainable and normalised CALL, the present research paradigm should shift in the following new directions.

No more discussion of the ‘new technology effect’ should be necessary. Rather, the role and usage of technology should be studied from the L2 perspective, and CALL activities or CALL contents should be investigated and developed from instructed SLA theories (Chapelle, 1997). Therefore, instead of asking whether using tablet PCs improves English speaking ability, how a tablet PC recording app can be applied to group activities in an English speaking class, or whether the *Smart Speaking 3.0* is effectively designed for Korean elementary school students’ mobile-assisted language learning, more appropriate questions are needed. To explore such inquiries as to “how,” “in what context,” or “why (or why not),” qualitative research methodologies, such as grounded theory approach or critical pedagogy, should be employed more often.

Second, the target interest should be geared towards normal curricula. Using digital technology for language learning should no longer simply be a pilot project that instructor-researchers attempt once with students in their class for a short period of time. CALL should be more often applied to schools (particularly public schools) within their regular curricula. According to Bax (2003), if CALL is to be normalized it has to be integrated into the daily classroom activities. However, it is certain that integrating ICT into the regular curriculum is not easy. Thus, realizing this requires cooperation between researchers (or associations) and schools (or education offices). Another important step is to educate teachers. Teacher variables, such as teacher beliefs, teacher resistance, and teachers’ ICT competence, should be more actively researched. Without teachers’ positive beliefs, CALL cannot be normalised.

Third, large-scale research should be promoted in CALL. Large-scale and longitudinal cumulative data can provide a suitable basis for policy studies that help to develop the details of nation-wide CALL projects, revision of ICT-integrated language curricula, the design of digital textbooks, or the validity and reliability of computer-based language tests. Big data, cross-cultural data or data through collaboration among Asian countries can serve as effective challenges for future CALL research in *English Teaching*. Establishing academic consortia among sister associations can be one suggestion, since individual researchers cannot possibly carry out such large research projects.

Finally, more efforts should be made internationally for theory building. Unlike other areas in TESOL, CALL theories have not been widely discussed in Korea, while numerous CALL practices have been attempted and reported with various applications and methods. Follow-up studies, replication studies, and critiques of frequently discussed topics would connect research findings to established theories.

English education is now an expanded and multi-faceted research field in its scope and method. *English Teaching* might not represent and lead all L2 research topics. Thus, the

recent issues and practices in CALL might not all be discussed in *English Teaching* as they have been in the past. However, it is hoped that thought-provoking CALL studies in *English Teaching* will become a leading force for change in future English education and research.

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References marked with an asterisk (*) are the studies included in the review.

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