CALL Research in Iran: An Integrative Review of the Studies between 2007 and 2019

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Abstract

Many countries all around the world have significantly contributed to the development of the multidisciplinary field of computer-assisted language learning (CALL). Thus far, several international reviews have demonstrated a worldwide view of CALL. However, the analysis of the development of CALL in individual countries, especially the highly contributing countries, is still under-researched in the related literature. The Islamic Republic of Iran has been identified as one of those contributing countries for which there is no record of the trends of CALL. Accordingly, the present integrative review tried to investigate how the field has been developed from its official emergence in 2007 up to 2019 in Iran. A total of 687 publications were scrutinized regarding the publication year, types of research, highly/poorly studied topics, key theories/models, context and sample participants, and key technologies. Contrary to many publications and the overall increasing trend of CALL, fluctuations in the number of publications resemble an unsteady trend of CALL in Iran. Extensive focus on quantitative methods and adult language learners at universities and language institutes, the repetitive study of some specific topics, lack of theoretical basis for the studies, and lack of studies on teachers and languages other than English are found as central concerns in Iran-based CALL. Based on the findings, we offered some implications to support transferring emergent CALL to established CALL in Iran.

Keywords: computer-assisted language learning, Iran-based trend, integrative review, CALL history

Introduction

Computers have changed the ways languages are learned and have given rise to computer-assisted language learning (CALL) as a distinct area of study across the globe. The increasing number of CALL publications in different countries is apparent evidence supporting the popularity and success of this multidisciplinary field. A review of the publications in three leading CALL journals by Gillespie (2020) revealed the contribution of 50 countries in the development of CALL, among which 20 countries had a significant

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portion. Even though this review offered a general overview of international CALL, yet, more in-depth investigations are required to demonstrate how CALL has been developing in these countries that changed them to significant contributors to CALL. One of these prolific countries in the above-mentioned review is the Islamic Republic of Iran that, despite many CALL publications, has no record of the past, present, and future of CALL. Furthermore, in a bibliometric analysis of technology-enhanced language learning by Chen et al. (2018), an Iranian university was identified among the most productive affiliations. Accordingly, the present study aimed at manifesting the trend of CALL in Iran, from its actual emergence in 2007 up to 2019, through an integrative review approach. The following section gives a concise introduction to the development of CALL followed by the review studies conducted in this area, and the history of CALL in Iran.

Review of Literature

History of CALL

The advancement of digital technologies has caused drastic changes in education in general, and in the field of English Language Teaching (ELT) in particular. The emergence of CALL, back in the 1960s, is the result of the integration of computers into ELT. One of the primary well-accepted definitions for this multidisciplinary field of study, offered by Levy (1997), states that CALL is "the study of applications of the computer in language teaching and learning" (p. 1). Later, Beatty (2003) provided another definition for CALL as "any process in which a learner uses a computer and, as a result, improves his or her language" (p. 7). However, Hubbard (2009) believed that Beatty's definition was too broad, and he modified it by elaborating on the two ambiguous terms of *computer* and *improve*. He refers to the *computer* as an umbrella term that encompasses not only desktop and notebook computers, but also other devices such as mobile phones, electronic whiteboards, mp3 player, and so forth, in addition to the networks connecting these devices. Hubbard adds that the term *improves* also embraces some other areas that CALL might improve including, "learning efficiency", "learning effectiveness", "access", "convenience", "motivation", and "institutional efficiency" (p. 2).

Holding the view that the term computer does not stand only for desktop computers, several researchers offered other terms that refer to the use of computers for learning in general and for language learning in particular. The highly used terms include, TEL (Technology-enhanced learning), TELL (Technology-enhanced language learning), CAL (computer-assisted learning), MAL (mobile-assisted learning), MALL (mobile-assisted language learning), web-enhanced learning (WEL), web-enhanced language learning (WELL), computer-aided instruction (CAI), computer-mediated communication (CMC). Additionally, another perspective of the use of technology for *teaching* rather than *learning* has proposed some more terms including technology-enhanced language teaching (TELT), computer-assisted language teaching (CALT), mobile-assisted language teaching (MALT), and so forth. It should be noted that in the present study the term *computer*, referring to computer technology, is used as an umbrella term encompassing all types of technological devices.

Even though CALL is generally accepted as an independent area of study, it still lacks the fundamental feature of having discrete CALL-based theories and pedagogical frameworks (Hubbard, 2009; Hubbard & Levy, 2016; Oskoz & Smith, 2018). That being the case, several researchers attempted to provide some frameworks and conceptualize the history of CALL, influenced by the phases in the history of ELT (Bax, 2003; Beatty, 2003; Chapelle, 2001; Colpaert, 2004; Levy, 1997; Warschauer & Healey, 1998). The classification of CALL history into three phases by Warschauer and Healey (1998) and into three approaches by Bax (2003) are among the dominant views in this regard.

Warschauer and Healey (1998) classified CALL into three phases of *Behavioristic CALL* (later called *Structural CALL*), *Communicative CALL*, and *Integrative CALL* based on the leading language learning theories of the time including behaviorism, communicative language teaching, and socio-cognitive approach to language teaching. Behavioristic CALL, mainly in the 1970s-1980s, was in the form of drill and practice, informed by Skinners' (1957) psychological principles and the model of behavioristic learning. Communicative CALL, in the late 1980s and early 1990s, informed by communicative language teaching methods, transferred CALL from drill and practice to a more communicative form. In this phase, the computer functioned as a stimulus not only to help students reach the correct answer but also to generate interactions and discussions. In the late 1990s, the cognitive view shifted toward the more socio-cognitive view of communicative teaching and led to integrative CALL (21st-century CALL) in which the emphasis is on authentic environments, authentic materials, and the integration of different skills as well as the full integration of technology into language learning.

Bax (2003) criticized Warschauer and Healey's classification of the historical phases and proposed three approaches to CALL as *Restricted CALL*, *Open CALL*, and *Integrated CALL*. Restricted CALL is quite similar to behavioristic CALL but different in terms of its potential to enable us to refer to the other aspects such as teachers' role, feedback, and software along with the theory (behaviorism). Open CALL that might be considered the current approach refers to fewer restrictions compared to restricted CALL and having more openness in different aspects such as feedback, teachers' role, and software. Bax's last approach, integrated CALL, considers *Normalization* as the final goal for CALL, in which technology becomes an inseparable part of language teaching and not seen as technology anymore.

CALL reviews

It is of great importance for academic figures and organizations to know about the most researched topics, influential years, turning points, existing gaps, and other significant information about a specific field of study. In other words, knowing the research trend of that specific field would be very helpful in making important decisions about further research and developments, policy formulation, funding, etc. This is also true about CALL, especially due to its dynamic nature that is constantly changing according to technological innovations. To date, in addition to the reviews of CALL in terms of its history and theoretical developments (Bax, 2003; Beatty, 2003; Chapelle, 2001; Colpaert, 2004; Colpaert, 2012; Levy, 1997; Warschauer & Healey, 1998), there have been several reviews of practical research on CALL from different perspectives (Chun, 2006; Egbert et al., 2018; Gillespie, 2020; Golonka et al., 2014; Hubbard, 2005; Hwang & Fu, 2018; Pérez-Paredes, 2019; Sharifi et al., 2017; Wang & Vásquez, 2012).

In an editorial of the CALICO Journal, Oskoz and Smith (2018) argued three main critical issues about CALL studies. They emphasized that CALL researchers usually list summaries of previous works in their studies in place of theoretical and pedagogical frameworks that inform the studies. The second issue is the absence of a clear research design and insufficient data about the subjects of the study, activities, duration of the treatment, and so forth. And the third issue is the lack of a sound theoretical framework that leads to an incongruous interpretation of the data in the studies and their ineffectiveness to contribute to the field. Concerned with the use of theory in CALL research, Hubbard (2008) reviewed studies published between 1983 and 2007 in CALICO Journal. The findings revealed extremely inconsistent use of theories in these studies in a way that the review of 166 studies resulted in 113 different theories. He identified that the theories were a) human-interaction theories extended by language learning, b) SLA theories extended by technology, c) theories of psychology and education, and d) theories of linguistics. Later, Hubbard and Levy (2016) analyzed the integration of theory into CALL research and classified the theories implemented in CALL studies into seven major categories that included, theory borrowing, theory instantiation, theory adaptation, theory ensemble, theory synthesis, theory construction, and theory refinement.

In terms of the types of technology implemented in CALL research, Golonka et al. (2014) reviewed over 350 empirical TELL studies with a focus on technology types and their effectiveness. The findings suggested limited evidence of technology effectiveness for foreign language learning, except for the use of automatic speech recognition (ASR) to enhance pronunciation, and the use of chat to grow language production and its complexity. Zhang and Zou (2020) also reviewed the technology type of 57 articles published between 2016 and 2019. They found that the highly used technologies were mobile phones, multimedia tools, socializing tools, speech-to-text recognition and text-to-speech recognition tools, and games, respectively.

Concerned with subject characteristics in CALL, Hubbard (2005) conducted a review on the articles published from 2001 to 2003 in four prominent CALL journals in terms of the number of the subjects, questionnaires extracting information, duration of the subjects' engagement with the task or application, subjects' prior experience with tasks or applications, and training subjects before and during the study. The review revealed the lack of explicit data on these characteristics in the studies, except for the data that most of the studies were conducted on inexperienced, untrained subjects.

More comprehensive reviews were also conducted on other issues of CALL such as areas of study. Levy (2009) reviewed technologies used for different areas and skills of language learning in the history of CALL and the findings indicated the major focus of CALL studies on "grammar, vocabulary, reading, writing, pronunciation, listening, speaking, and culture" (p. 769). Meanwhile, Okonkwo (2011) also pointed out that the majority of CALL studies report the noteworthy effect of technology on reading and listening. Furthermore, Wang and Vásquez (2012) conducted a review scrutinizing the use of Web 2.0 technologies in second language learning between 2005-2009. It was found that the scope of research had evolved from only focusing on the four skills of language learning to other areas such as learner identity, learning communities, and online collaboration. They also identified insufficient research on the students' outcome and progress as well as the absence of sound theoretical frameworks in the reviewed studies.

Recently, two all-inclusive overviews of CALL research were proposed by Gillespie (2020) and Shadiev and Yang (2020). Gillespie (2020) reviewed publications

in three prominent international CALL journals, namely ReCALL, CALICO, and Computer-Assisted Language Learning Journal between 2006 and 2016. The investigated issues included top countries working on CALL, the variety of topics researched, frequency of CALL publications, types of publications, and types of empirical studies (small-scale or broad). Overall, the findings revealed that the number of CALL research is increasing internationally, but with a large focus on some specific topics and leaving several other topics less studied or untouched. The first five highly studied topics include writing, CMC, vocabulary, speaking, and corpora. It was also found that the majority of the papers were small-scale empirical studies rather than meta-analytical or theoretical. Shadiev and Yang (2020) also reviewed language learning articles published from 2014 to 2019 in the top ten educational technology journals. The findings resembled 2014 with the least and 2017 with the most numbers of publications. Writing, vocabulary, and speaking also were highly studied topics, and games and videos were highly implemented technology.

History of CALL in Iran

As stated by Marandi (2002), language educators and teachers in Iran were aware of the importance of using technology for language learning, yet their lack of technological knowledge prevented them from the proper implementing of technology into the classrooms. Gradually, the Ministry of Education with the assistance of the Ministry of ICT in Iran planned to integrate technology into the educational system (Ebadi, 2005). Shafiee (2005) reported that between 2005 and 2009, the Ministry of ICT was responsible for developing e-learning in the educational system in Iran (as cited in Fotouhi-Ghazvini et al., 2008). Therefore, teachers were invited to welcome technology to their classes both at schools and universities. Accordingly, efforts were put into training teachers to apply technologies for EFL teaching, and in 2007, the first CALL course was officially established at Alzahra University for Ph.D. courses of TEFL, and in 2010 for M.A. courses (Hedayati & Marandi, 2014; Marandi, 2019). Following that, a few other universities offered CALL courses to TEFL students and national interest increased in this area. The most recent attempt in CALL is the establishment of CALL as an independent discipline, rather than the subfield of SLA (Chapelle, 1997), at the M.A. level in some Iranian universities, beginning from February 2020.

To date, there have been numerous studies conducted on CALL in Iran. In the study by Gillespie (2020), even though only three leading CALL journals were investigated, Iran was placed among the top 20 countries with a significant contribution to CALL. Despite several limitations and barriers of implementing CALL in ELT courses in Iran (Dashtestani, 2012; Hedayati & Marandi, 2014; Jahanban-Isfahlan et al., 2017), this area has been developed largely, especially in terms of MALL, one of the major areas of CALL. The effect of using mobile devices to enhance students' language learning skills (Sorayaei Azar & Nassiri, 2014; Baleghizadeh & Oladrostam, 2010; Khodashenas & Amouzegar, 2013), strategies (Elekaei et al., 2019), and their attitudes toward language learning (Dashtestani, 2015; Dehkordi & Taki, 2018) have been investigated by several researchers. However, the major defect of CALL in Iran is that the trend of CALL has not been addressed in the studies. There have been some meta-analyses and reviews with a focus on specific areas of CALL (Dehghanzadeh et al., 2019; Gilakjani, 2017). However, thus far, there has been no explicit record of how this area has been developed in the

Iranian context and where it is heading in the future. Therefore, this study outlines CALL research in Iran since its actual emergence through an integrative review approach directed by the following questions,

1. What is the trend of CALL publications in Iran?
2. Which topics are the highly/poorly studied topics in Iran-based CALL?
3. What types of research are dominant in Iran-based CALL?
4. What are the key theories/models in Iran-based CALL?
5. What are the contexts and sample participants of Iran-based CALL?
6. What are the key technologies in Iran-based CALL?

Methodology

The present study is an integrative review of the development of CALL research in Iran between 2007 and 2019. Unlike rigorous meta-analyses and systematic reviews, as stated by Whittemore and Knafl (2005), integrative reviews "are the broadest type of research review methods allowing for the simultaneous inclusion of experimental and non-experimental research to more fully understand a phenomenon of concern" (p. 547). Moreover, Hwang and Tsai (2011) argue that a 10-year review of the literature on a specific research area can indicate the trend of that area, especially if they are divided into two halves. Therefore, in this study, it was first decided to review the publications from 2010 to 2019; however, regarding the history of CALL in Iran and its official emergence as an established university course in 2007 (Hedayati & Marandi, 2014; Marandi, 2019), this range was changed to 2007 to 2019, a 13-year review of Iran-based CALL. It should be mentioned that publications in 2020 were not included since 2020 has not finished yet and not all the publications are indexed in the databases.

The literature search stage was conducted by a systematic search through the three leading databases of Web of Science, Scopus, and Google Scholar using the following combination of keywords: 'computer-assisted language learning' and 'Iran'; 'mobile-assisted language learning' and 'Iran'; 'technology-enhanced language learning' and 'Iran'; 'computer' and 'language learning' and 'Iran'; 'mobile' and 'language learning' and 'Iran'; 'technology' and 'language learning' and 'Iran'. Additionally, to make sure about the findings from the databases, the five international journals of *ReCALL, Computer Assisted Language Learning, Language Learning & Technology, JALT CALL Journal, and CALL-EJ* were checked manually with the keyword of 'Iran', and the five national journals of *Journal of Research in Applied Linguistics, Iranian Journal of Language Teaching Research, Journal of Teaching Language Skills, International Journal of Language Testing, Iranian Journal of Applied Language Studies* were searched for CALL publications. Moreover, since the focus of the study was on a country in which the first language is Persian, we searched through the national journals of language learning published in Iran in Persian. Our primary search indicated that there were numerous technology-enhanced learning studies, but only a few numbers concentrated on language learning; therefore, we restricted our search only to studies written in English.

The initial search of all the databases and journals resulted in 1047 publications, from which 188 publications were eliminated due to duplication in more than one

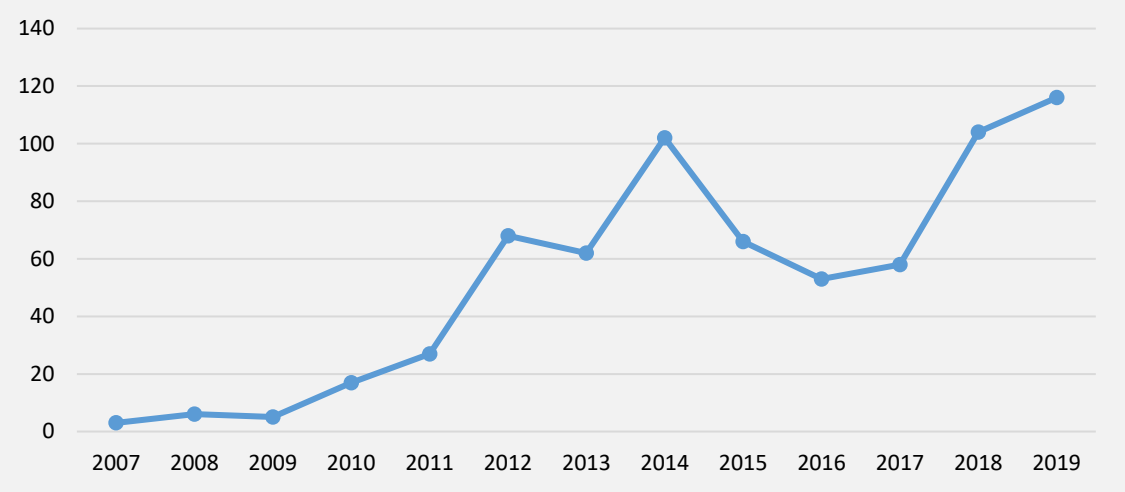
database. We were only concerned with original peer-reviewed journal publications and book chapters; accordingly, conference presentations, book reviews, and unpublished theses and dissertations were removed in the initial screening and 699 papers remained for further analysis. Then, the titles and the abstracts of all the studies were scrutinized thoroughly, and 12 empirical studies that were written by Iranian authors working abroad and with a context and focus other than Iran were also eliminated. Finally, 687 studies remained for the final analysis (649 journal articles, and 38 book chapters). These studies were reviewed carefully by two CALL researchers individually in terms of the publication year, journals of publication, types of research, highly and poorly researched topics, key theories and models, context and sample participants, and key technologies. Where possible this data was extracted from the titles and the abstracts of the studies, and if not, the content of the papers was thoroughly reviewed. As a final point, the findings were checked by a CALL expert and some minor modifications were applied. A huge corpus of data was collected from which the major parts are reported in the present study. Descriptive statistics of the data and graphs are generated using MS Excel. It should be mentioned that the present study searched the three leading databases in addition to manually searching through some international and national journals to cover all Iran-based CALL studies. However, similar to other review studies covering a large number of articles, there might be a possibility of missing a few numbers of studies not indexed in the searched databases. Besides, the combination of the three main keywords of *computer*, *mobile*, and *technology* was implemented in searching the databases. Although we believe that CALL articles necessarily include one of these umbrella terms, there might have been a few CALL articles with no such keywords that are not covered in this study.

Results and Discussion

Publication trend

Figure 1 exhibits the distribution of Iran-based CALL publications by year from 2007 to 2019. As the figure shows, CALL research has had a notable changing trend since its emergence. Overall, apart from the ups and downs in the figure, it has been increasing throughout this period with some sharp rises, mainly following some CALL course establishments in some universities. Surprisingly, the findings are in contrast with the review of CALL publications in the top 10 international journals from 2014 to 2019 in which 2014 resembled the least number of publications and 2017 the most (Shadiev & Yang, 2020). The existing contrast reflects the strong effect of national publications causing sharp rises or falls in the figure.

Figure 1
The trend of Iran-based CALL publications



Journals with the largest number of publications

Tables 1 and 2 display the top five international and national journals with the highest number of Iran-based CALL publications. Since there were no publications up to 2011 in the international journals and no publications in the national journals in 2007 and 2008, due to the space limitation, these years were eliminated from the Tables. Even though it might be easier to get a work published in a national journal, the distribution of the publications in international and national journals manifests the researchers' interest in publishing their works in high-rank international journals with a wider audience. This could also resemble authors' obsessions with "academic meritocracy" (Colpaert, 2012) that hinders advancing knowledge, and rather changes research to the notion of publication for academic promotion.

Table 1
Top 5 international journals with the largest number of publications

Journals	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Computer Assisted Language Learning (UK)	1		3	1	4	1	5	2	10	**27**
Teaching English with Technology (Poland)		1	2	1	2	5	1	6	5	**23**
Theory and Practice in Language Studies (Finland)	3	3	3	5	2	2		2		**20**
International Journal of Applied Linguistics & English Literature (Australia)		2	1	5	1		4	4		**17**
CALL-EJ (Australia)			1		1	3	3	3	5	**16**
	4	**6**	**10**	**12**	**10**	**11**	**13**	**17**	**20**	**103**

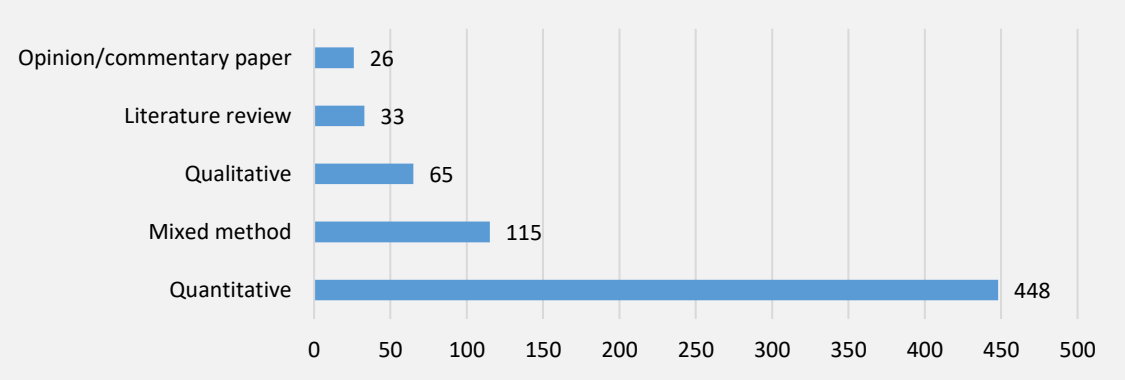
Table 2
Top 5 national journals with the largest number of publications

Journals	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Journal of Teaching Language Skills (JTLS)	1	1	1	1	3	1	1	5	4	3	3	**24**
International Journal of Foreign Language Teaching & Research					5	1	1	1	2	1	5	**16**
Iranian EFL Journal		1		5	4	5						**15**
Iranian Journal of Applied Language Studies		1	2				2	3	1	1	1	**11**
Journal of Modern Research in English Language Studies							2	1		2	4	**9**
	1	**3**	**3**	**6**	**12**	**7**	**6**	**10**	**7**	**7**	**12**	**75**

Types of research

The classification of CALL studies in Iran is demonstrated in Figure 2. The studies were classified into empirical studies including quantitative, qualitative, and mixed-method; literature reviews; and opinion/commentary papers. As stated by Hubbard (2009) CALL research first began by basic empirical quantitative studies that compared technology-enhanced with non-technology-enhanced language learning, or later the comparison of different types of technology-enhanced learning with each other. However, the quantitative approaches gradually gave place to more inclusive qualitative studies (Hubbard, 2009). Meanwhile, a plethora of empirical quantitative studies on CALL in Iran specifies that CALL is still following the initial approaches with the large number of studies comparing experimental and control groups that manifest the advantages of CALL over traditional ELT. Besides, the analysis of the mixed method papers revealed that the majority of the papers follow the design of "QUAN + Qual, which is useful to describe an aspect of a quantitative study that cannot be quantified or to embed a component within a larger, primarily quantitative study" (Dörnyei, 2007, p. 172). There are also 33 literature review articles that reviewed specific areas of CALL, mainly MALL. The subject of the review papers concurs with the highly researched topics that focused on the use of technology to enhance specific language skills. Furthermore, a few numbers of publications were opinion/commentary papers, arguing the advantages or disadvantages of the use of technology for language learning in general, and for ELT in Iran in particular, with regards to language teaching policies of Iran.

Figure 2
Types of Iran-based CALL publications



Highly/poorly studied topics

The highly and poorly studied topics were extracted by keyword analysis and in several cases the analysis of the titles and abstracts. Initially, all the author-assigned keywords of the studies were copied and arranged alphabetically in an Excel file (N=2864). However, keyword frequency could not indicate the researched topics of the articles since there were numerous similar topics with slightly different collocations as well as multiple generic keywords or keywords related to the method of the articles. Therefore, keywords were scrutinized and categorized into:

a) Keywords related to topics (N=1942). Similar keyword collocations were assigned into one category. For instance, “reading comprehension”, “reading skill”, “reading proficiency”, “reading ability”, and “EFL reading” could all be labeled as “reading”. It should be mentioned that to make sure about assigning a keyword into a specific topic, titles, and when necessary abstracts of the articles were also checked. In many cases, the first two or three keywords identified the central topic of the article. Moreover, there were 68 studies, including book chapters and some articles, for which there were no author-assigned keywords. Consequently, the topics were extracted through the analysis of their titles and abstracts.
b) Keywords related to research method (N=155), and the theoretical framework of the studies (N= 74).
c) Generic keywords (N= 777). Keywords such as CALL, language learning, language teaching, EFL, language, technology, etc.
d) Others (N=11). 11 keywords could not be assigned to any categories and did not indicate any specific meaning such as, use, assist, change, role, etc., and they were eliminated before the analysis.

Finally, the analysis of 687 articles resulted in 41 studied topics that were studied 1942 times throughout the studies, as several studies investigated two or more topics simultaneously (Table 3).

Table 3
Highly/Poorly Studied Topics in Iran-Based Publications

	Topics	Freq.		Topics	Freq.
1	Vocabulary/ lexicon/ gloss/ word	202	**22**	Task Based language learning/ teaching	23
2	Affective/psychological factors (Attitude, perception, motivation, anxiety, self-direction, …)	180	**23**	Blended learning	21
3	CMC	126	**24**	Literacy (Digital, CALL, ICT, multimedia, …)	21
4	Web-based learning	123	**25**	Linguistics	18
5	Writing	120	**26**	Games	17
6	Software/application studies	111	**27**	Text analysis	16
7	Assessment/testing	101	**28**	Teacher education	15
8	Learning strategies/styles	100	**29**	Gender study	13
9	Reading	100	**30**	Flipped classroom	13
10	MALL	73	**31**	Idiom/expression/ proverb	12
11	Speaking	62	**32**	Learning environment	11
12	Grammar	60	**33**	Dictionaries	10
13	Listening	59	**34**	Technological, pedagogical content knowledge (TPACK)	10
14	Feedback	55	**35**	RALL (Robot assisted language learning)	9
15	Video/movie/film/ animation	45	**36**	Critical thinking	5
16	Pronunciation	37	**37**	Digital storytelling	5
17	Teaching strategies/styles	36	**38**	MOOCS	5
18	Corpora	34	**39**	Translation	5
19	Cultural/social studies	31	**40**	Virtual Reality	3
20	Online/virtual/distance learning	29	**41**	Augmented reality	1
21	Pedagogy/education	25			

Presented in Table 3, the first highly studied topic among CALL publications in Iran is the study of vocabulary learning. In line with the international reviews of applied linguistics in general (Lei & Liu, 2018), and CALL (Gillespie, 2020) or MALL (Hwang & Fu, 2018; Elaish et al., 2017) in particular, vocabulary has always been among the top highly studied topics, especially in the case of non-native speakers (Hazenberg & Hulstun, 1996; Hwang & Fu, 2018; Shadiev & Yang, 2020). Following the focus on vocabulary, similar to the highly studied topics in international MALL and CALL (Shadiev et al., 2017; Wang & Vásquez, 2012), psychological and affective factors have received special attention in the literature of Iran-based CALL. Student attitude (N=34), and motivation (N=30) were the most, and teacher attitude (N=14) and CALL anxiety (N=12) were the least studied psychological factors.

Among the highly studied topics in Iran, CMC, web-based learning (such as English websites, blogs, wikis, WebQuests, etc.) and software/application studies exclusively relate to CALL rather than generally applied linguistics. In a similar vein, CMC has been a highly studied topic in international CALL (Gillespie, 2020).

Furthermore, as argued by Hubbard (2009), the emphasis on the separation of skills in ELT research has also been transmitted to CALL which is well-illustrated in the findings of the present study. Contrary to the study of listening as the top skill in MALL (Hwang & Fu, 2018; Elaish et al., 2017), the international CALL (Gillespie, 2020; Shadiev & Yang, 2020; Wang & Vásquez, 2012) and the findings of the present study indicated writing skill as the highly studied topic. The reason is attributed to the features of the digital devices among which mobile phones lack sufficient features for boosting writing practice (Hwang & Fu, 2018). What is more, unlike the study of some topics in international CALL such as natural language processing (NLP) and content and language integrated learning (CLIL) (Gillespie, 2020) that are not even touched in Iran-based CALL, there exist some more topics studied in Iranian publications, including learning and teaching strategy/style, and critical thinking.

Key theories and models

Despite the development of CALL globally, its central concern is the absence of specific CALL-based theories and frameworks. CALL researchers make use of the theories established for other areas of study (Levy & Stockwell, 2006), or rely on SLA theories (Egbert & Hanson-Smith, 2007), and very few "native CALL" theories appear in the studies (Hubbard, 2008). Theory, pedagogy, and research have been sacrificed by technology, and CALL is not directed by research and theoretical frameworks but rather by technology in several countries. In a similar vein, Jahanban-Isfahlan et al., (2017) hold the view that this can also be true about Iran. In line with this view, we first searched for the appearance of the terms *theory*, *theoretical*, *theories*, and *model.* The searched terms appeared in 264 papers, but the detailed analysis of the papers indicated that only 165 papers had the actual implementation of the terms, and the rest were just general references to them. Totally, 88 theories and models were identified across the reviewed articles, many of them used only once. Table 4 resembles the top five highly used theories in the articles. The numbers in the table indicate the number of the articles in which the theory was implemented, and it does not count the total frequency of the term theory across the articles. It should also be noted that some articles implemented a combination of two or more theories or models at a time. In addition to the serious drawback of the lack of theoretical basis in CALL studies in Iran, in agreement with Hubbard (2008), the findings indicate significant inconsistencies in the use of theories. Little attempts to use SLA theories and more reliance on general learning theories or the theories developed for other disciplines such as psychology have been the core issues.

Table 4

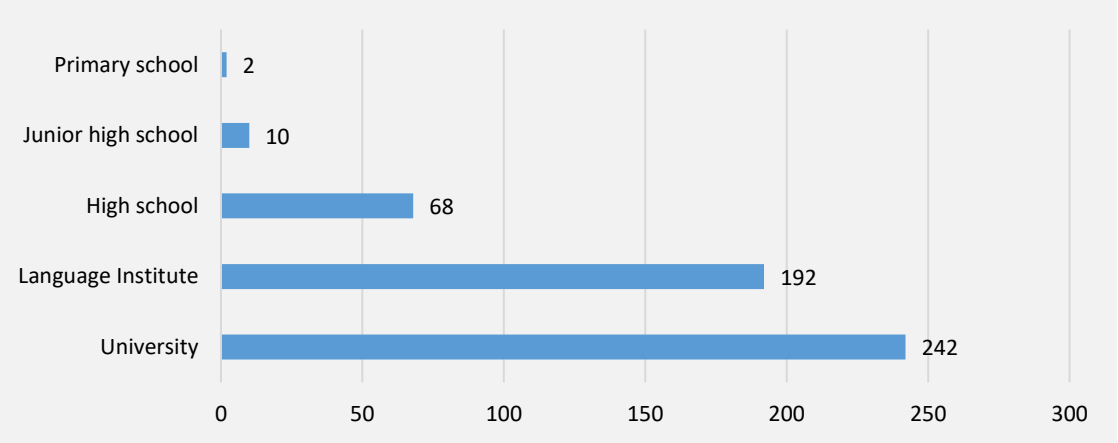
Key Theories and Models in Iran-Based CALL Publications

Theory	N. of Articles
Sociocultural theory	44
Vygotsky's theory of the zone of proximal development	37
Dual Coding Theory	17
Cognitive theory of multimedia learning	11
Activity Theory (AT)	10
Technology Acceptance Model (TAM)	8

Context and sample participants

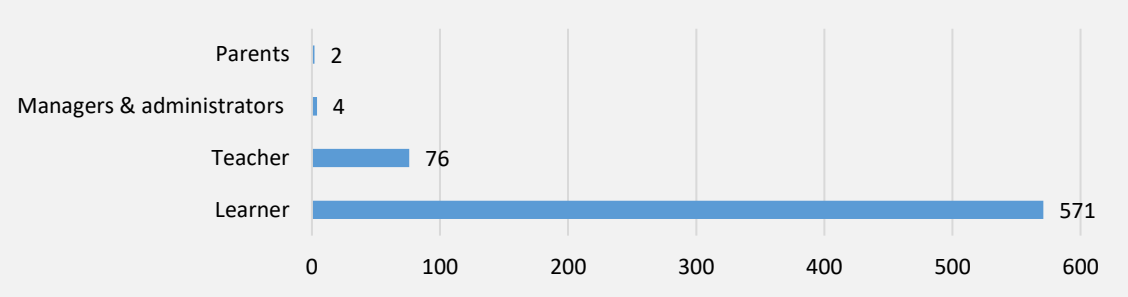
It might be the difficulties of implementing technology into young learners' ELT and into schools that restrict CALL mainly to universities and language institutes. This restriction to mostly higher education contexts was also observed in the reviews by Elaish et al. (2017) and Hwang and Fu (2018) on mobile language learning. The main reason could be for CALL researchers are mainly faculty members or university students with easier access to participants at university (Hwang & Fu, 2018). Figure 3 demonstrates the analysis of the contexts of the studies of CALL publications in Iran. Some studies examined two or more contexts at the same time, and some studies did not specify the context of the study. The analysis reveals a lack of research at the school level, especially junior high school and elementary school, and also no studies at the preschool level. Furthermore, since studying foreign languages at language institutes is very popular in Iran (Jahanban-Isfahlan et al., 2017; Zandian, 2015), institutes could provide appropriate contexts for EFL researchers after universities.

Figure 3
Contexts of Iran-based CALL publications



As presented in Figure 4, language learners are the main sample participants in CALL publications in Iran, which shows the dominance of CALL over CALT (computer-assisted language teaching). Beatty (2003) defines CALT as computer-assisted language learning with an explicit focus on the teacher rather than the learner. The insufficient attention to teachers in the Iranian context is not only identified through the limited number of CALL-based studies on teachers but it is also indicated in the lack of proper CALL teacher training and professional development courses (Hedayati & Marandi, 2014).

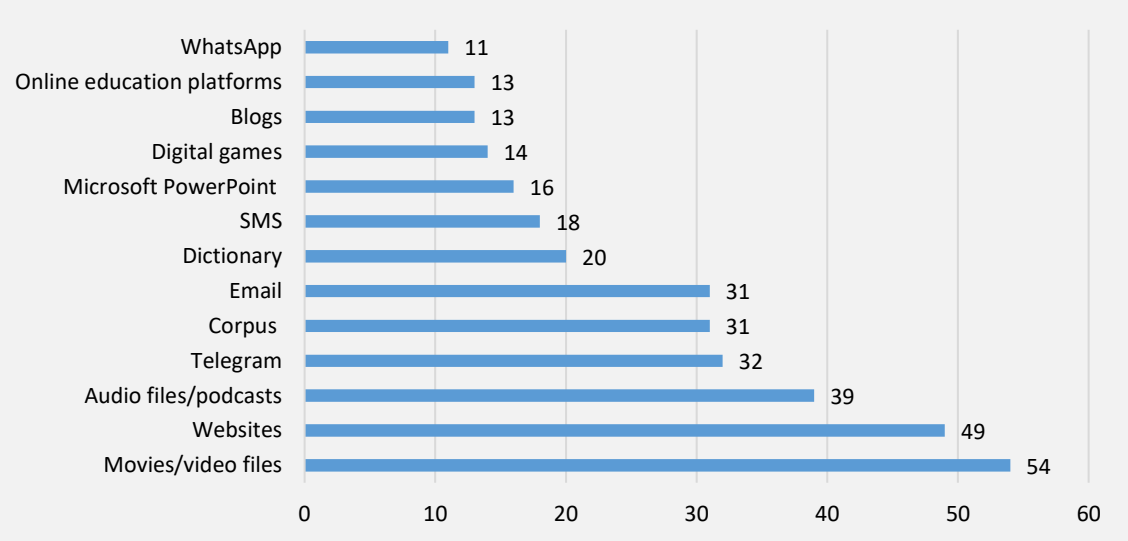
Figure 4
Sample participants in Iran-based CALL publications



Key technologies

As indicated by its name, the fundamental feature of CALL is inevitably the use of technology. Therefore, knowing the highly used technologies and the technologies left untouched is significant. The review of the articles resulted in 380 articles that identified the implemented technologies. Figure 5 presents technologies that were implemented more than ten times. Similar to international CALL (Shadiev & Yang, 2020; Zhang & Zou, 2020), multimedia technologies such as movies/video files and audio files/podcasts, referred to as well-established technologies (Golonka et al., 2014), are the highly used technologies in Iran-based CALL. It is also indicated that Iranian researchers frequently make use of different freely available language learning websites (e.g. https://englishteststore.net/, http://www.manythings.org/, https://www.englishmind-online.com/,) which is less used by other CALL researchers. Technologies for socializing and collaboration such as Telegram, email, SMS, WhatsApp, blogs, as well as some other technologies such as wikis, Skype, Viber, etc. that were used fewer times in the reviewed articles seem to make a significant contribution to language learning and CALL research in Iran. Contrary to the frequent use of digital games in CALL (Shadiev & Yang, 2020; Zhang & Zou, 2020), they have received little attention among Iranian researchers.

Figure 5
Key technologies in Iran-based CALL publications.



Implications for Research and/or Practice

Building upon the findings of the present study, this section elaborates on the current trends and future directions of Iran-based CALL and offers some implications for future research and practice.

It is believed that field-specific journals could give appropriate directions to advancing knowledge and the development of a specific field. The most highly contributing countries to CALL across the globe (i.e., USA, UK, Taiwan, and Japan), investigated by Gillespie (2020), are the ones that possess well-known top-ranked CALL journals. However, there are no such journals owned by Iranian publishers. Since researchers have to submit their works to general language teaching journals, the journal issues cannot be indicative of the trend of CALL in Iran. Accordingly, the establishment of CALL journals in Iran and other countries in which CALL is emerging rather than established can be of significant importance.

In line with the international trend of CALL, empirical studies employing quantitative methods, lack of theoretical basis, extensive focus on adult language learners at universities and institutes, lack of studies on teachers and languages other than English, and extensive study of some specific topics are central concerns in Iran-based CALL. Some of these concerns mirror the existing concerns in ELT that have been transferred to CALL and provide future research directions. Therefore, CALL researchers need to invest more efforts in overcoming the existing above-mentioned gaps in their future studies.

Moreover, after a decade of its emergence, the current CALL in Iran seeks fundamental revolutions. The findings of the present review can guide CALL researchers particularly newcomers to better comprehend the status of the field. Firstly, Iranian researchers should strive to build their works upon sound theoretical frameworks. Secondly, although CALL relates to language learning and learners, CALT and the importance of teachers as the main mentors of learning should not be under-researched. Furthermore, taking advantage of the opportunities provided by the pandemic COVID-19 and noteworthy changes in the educational system of schools, it is time for Iranian CALL researchers to aim at investigating young school learners' language learning with technology. Additionally, the multi-disciplinary nature of CALL gives room to topics other than merely ELT topics. However, the huge gap between highly studied topics such as vocabulary and psychological factors and the poorly studied topics warns researchers about the "syndrome of publish and perish" (Colpaert, 2012) and unnecessary representation of past knowledge.

Conclusion

The present study offered a comprehensive review of CALL from its emergence in 2007 up to 2019 in Iran through six research questions. The questions were discussed in the previous sections, and insights were provided about the publication trend, types of research, highly/poorly studied topics, key theories/models, context and sample participants, and key technologies.

Overall, although the trend of CALL has been increasing from its appearance in Iran, the existing fluctuations throughout the investigated period resemble that CALL has not yet reached a steady state in Iran. New course establishments and specific institutional practices bring sudden rises to the publication trend which is sometimes followed by sharp falls after a while. Contrary to the international CALL that has an increasing trend, this unsteady trend could be true in several countries that are struggling to introduce CALL as an individual discipline.

In conclusion, unlike the numerous reviews and bibliometric analyses of CALL across the globe, its review in individual countries especially the most contributing couturiers to CALL is missing. CALL as an independent discipline requires more detailed information of its trend in different settings, both emergent and established, rather than a holistic international picture.

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