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Students' attitudes towards computer-assisted language learning and its effect on their EFL writing

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Abstract

This study aimed to assess the attitudes and perceptions of English-as-a-Foreign-Language (EFL) students towards the use of computer-assisted language learning (CALL) programmes and their perceived view on an online writing system that was developed in the present study by means of a questionnaire, as well as an asynchronous discussion forum. An online writing system was developed and a sample of 30 EFL learners studying at Sharif University of Technology in Iran were assigned to the study. The CALL attitudes of the participants were assessed by a CALL questionnaire, which indicated that Iranian students attached a high value to CALL. Moreover, the comments of the participants that were posted on a discussion forum were analysed with the aid of Henri's framework, which revealed the presence of certain concepts and themes within the views of learners towards the use of computers in their educational settings.

Keywords: Computer-assisted instruction (CAI), computer-assisted language learning (CALL), EFL writing, student attitudes.

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1. Introduction

As technology develops, computer-assisted language learning (CALL) is increasingly developing into a matter of paramount importance on account of the opportunities it provides in language education. With respect to language teaching, there is now ample research on the evaluation of the attitudes of language learners as well as the perceptions of instructors towards computer-based language education in many countries; in Iran, however, the number of thorough empirical research papers is not as high as desirable. Thus, a consistent endeavour for CALL evaluation and the attitudes of students towards computer use seems to be mandatory across the educational curricula in Iran.

In the current study, therefore, in order to fully understand the actual insights and impressions of learners with respect to computer-based instructions in language-learning contexts, Iranian students were given the opportunity to express their general opinions on CALL and the software they used in their course for academic writing as potential contributors to the development of language-learning tools. In this regard, the developed key research question was as follows:

RQ: What are the attitudes of Iranian university students towards CALL and what are its effects on their English-as-a-Foreign-Language (EFL) academic writing performance?

2. The history of CALL

According to Warschauer and Healey (1998), CALL, which appeared in the 1960s, has experienced constant growth within the past three decades and can be categorised into three major phases: behaviouristic CALL, communicative CALL and integrative CALL. Warschauer and Healey (1998) stated that each phase is compatible with a particular type of technology along with a specific method of language teaching; this is described in the following subsections.

2.1. Behaviouristic CALL

The primary stages of CALL, behaviouristic CALL, were underpinned by the behaviouristic theories of learning, which were devised in the 1950s and executed in the 1960s and 1970s. Programmes of behaviouristic CALL entailed repetitive language drills called 'drill-and-practice'. In this concept, the computer was considered as 'a mechanical tutor which never grew tired or judgemental and allowed students to work at an individual pace' (Warschauer & Healey, 1998, p. 57). Consequently, in this phase, key research concentrated on the design and development of CALL tutoring systems for mainframe computers, discussions on the function of computers in language education and comparison of conventional and computer-assisted classrooms.

2.2. Communicative CALL

The second phase, which was centred on a cognitive view of communicative teaching, appeared in the late 1970s and early 1980s, when the behaviouristic perspective had been disapproved both theoretically and pedagogically. Advocates of this phase believed that the CALL programmes should highlight the use of forms, rather than merely concentration on forms themselves. For many supporters of communicative CALL, 'the focus was not so much on what students did with the machine, but rather what they did with each other while working at the computer' (Warschauer & Healey, 1998, p.57). Accordingly, in this stage, the roles of educators and language learners in the computer-based environment attracted the attention of researchers.

2.3. Integrative CALL

The third phase of CALL, integrative CALL, which started in the 1990s, correlated with the social or socio-cognitive stance on language teaching and stressed on the use of language in actual contexts.

This particular approach was created based on two major technological innovations: multimedia and the Internet. This view attempted to incorporate various language skills (listening, speaking, listening and writing) and contributed towards pointing the direction of language education towards the process of learning. Therefore, as Warschauer and Healey (1998) described, learners make use of various technological tools and resources in a continuing process of language learning as opposed to visiting the computer laboratories for isolated language drills. Detailed information with regard to the different levels of technology in addition to various pedagogical approaches prevalent in the three phases of CALL is presented in Table 1.

Table 1. Different Phases of CALL

Stage	Technology	Pedagogical approach	Computer use	Teacher role
Behaviourist structural	Mainframe	Grammar-translation and audiovisual	Translation exercise drill-and-practice	Only source of information Instructor
Communicative	Personal computer	Communication approach	Role-plays, textual reconstruction, simulations	Activator Facilitator
Integrative	Multimedia and web-based apps	Content-based learning	Authentic social contexts, exercises, combining reading, listening and writing	Supervisor Mentor

Adopted from Warschauer and Healey (1998).

2.4. The status quo of CALL in Iran

Researchers began to turn their attention to the effectiveness of CALL programmes in the Iranian contexts in the early 2000s. Among the first studies that were concerned with the status quo of CALL in Iran was the work of Marandi (2002), in which 31 scholars of EFL teaching from three different universities in Tehran answered a questionnaire that investigated their orientation in relation to the use of computers and the Internet for English language classes. Based on the outcome, a substantial number of participants claimed to be familiar with computers and the Internet as helpful instruments for EFL classes. Further evidence of considering CALL as a subject of research was provided in a presentation titled 'Iranian Teachers' Beliefs about the Application of CALL in Language Classrooms' by Latif and Lotfi (2007). In their study, a growing interest in the potency of the integration of CALL activities in language classes was affirmed by a questionnaire along with face-to-face interviews with 151 Iranian English teachers. More recently, Rahimi and Yadollahi (2010) targeted analysing the attitudes of 30 female language learners towards CALL by means of a questionnaire which revealed that Iranian students showed general positive attitudes towards computer-based programmes. Moreover,Fatemi Jahromi and Salimi (2013) aimed to examine the perceptions of language educators and learners towards computer-assisted activities in a high school in Iran; according to the outcome, emphasis was placed on the desirability of integrating computers in language classes.

3. Method and materials

The sample was made up of 30 undergraduates of the General English language course, who were studying at Sharif University of Technology. All of the participants were native speakers of Persian; their age range was 17–23 years; they had all been exposed to a minimum of 4years of formal EFL instruction at high school. Of the participants, 28 were male (93.3%) and 2were females (6.7%); the participants had a mean age of 19 years.

To implement this study, an academic writing website, considering the premises of CALL with the URL www.carsmodel.org, was designed and developed as a learning tool. Over a period of 8weeks, the participants were required to produce eight pieces of academic writing by following online instructions. In order to understand the attitudes of learners, the following instruments were developed and used: a) an online A-CALL questionnaire and b) an online discussion forum.

In order to understand the attitudes of learners towards computer use for educational purposes, an English version of the 'A-CALL questionnaire', which was validated by Vandewaetere and Desmet (2009), was administered to the participants on the website. This was a questionnaire that included 20 items on a seven-point Likert scale from 1 (totally disagree) to 7 (totally agree; with 4 being neutral), which evaluated the overall views of EFL students towards CALL.

The A-CALL questionnaire consists of four sub-factors: Factor 1 (effectiveness of CALL *vs.* non-CALL) has four items (2–5), Factor 2 (surplus value of CALL or the additional advantages of using CALL alongside more traditional learning approaches) has 10items (1, 6–12 and 16–17), Factor 3 (teacher's influence on the perception of students towards CALL) has 3items (13–15) and Factor 4 (degree of exhibition to CALL) has 4items (18–20). The questionnaire was used in the Iranian settings (Alemi & Alipour, 2014; Rahimi & Yadollahi, 2010) and is reported to have high reliability and validity in the Iranian context. Moreover, Cronbach's alpha indicated that this questionnaire enjoys an acceptable level of reliability (0.75) in the context of this study.

Moreover, through the course of this study, participants were encouraged to write their reflective comments with regard to their opinions towards CALL in general, the design of the online system, the suggestions with regard to the improvement of the system and questions related to the content of their online course on the discussion forum. The participants were free to use either their L1 or L2, or a mixture of both. After the conclusion of the study, the participants were requested to answer the English version of the A-CALL questionnaire online in order to help the researcher gain in-depth knowledge of the use of technology, as well as the advantages and disadvantages of the integration of technology into educational settings.

This study was designed as a mixed-method analysis since it included collecting and interpreting complementary quantitative and qualitative data. A quantitative analysis was employed to statistically analyse the answers of students in response to the A-CALL questionnaire by using frequency, mean and SD data. After collecting the comments posted by the participants in the discussion forum, the responses were analysed in the qualitative part in order to gain a more in-depth insight into the attitudes of the learners with regard to CALL.

4. Result

In order to analyse the perceptions of participants towards CALL, the frequency of all the responses was computed and the mean for all the items of the A-CALL questionnaire was calculated. As shown in Table 2, with regard to most of the items of the survey, the learners were moderately positive in their views of CALL.

Table 2. Descriptive statistics for scores of A-CALL questionnaire

Items of the questionnaire	Mean
1. My language learning will proceed more when this is assisted by a computer.	4.13
[a]2. Learning a foreign language assisted by computer is not as good as learning it by oral practice.	3.53
[a]3. Computer-based language tests can never be as good as paper-and-pencil tests.	5.27
[a]4. Computer-assisted language learning is less adequate as the traditional language learning.	4.53
[a]5. People who learn a language by computer-assisted learning are less proficient than traditional language learners.	4.50
6. Computer-assisted language learning is a valuable extension of the classical learning methods.	5.10
7. Computer-assisted language learning gives more flexibility to language learning.	5.20
8. Computer-assisted language learning is as valuable as traditional language learning.	4.63
9. Computer-assisted language learning can stand alone.	3.20
10. Learning a foreign language by computer constitutes a more relaxed and stress free atmosphere.	5.20
11. Learning a foreign language by computer enhances your intelligence.	3.70
12. I (would) like learning a new language by computer.	4.43

13. Teacher's attitude towards CALL largely defines my attitude towards the use of computers in language learning.	4.07
14. Teacher's enthusiasm towards CALL largely defines my motivation for using computers in language learning.	4.10
15. Teacher's proficiency of using computers in language learning largely defines my attitude towards computer use in language learning.	4.27
16. I have faith in computer-based language tests.	4.37
17. I have faith in computer-based language exercises.	4.50
18. I feel less inhibited when communicating in the foreign language via computer (chat) than in a face-to-face situation.	4.77
[a]19. In a face-to-face learning situation (classroom) I often experience anxiety when speaking in the foreign language.	4.10
[a]20. For me, the threshold to start a face-to-face conversation is bigger than starting a virtual (computer-assisted) conversation.	3.60

[a]Reverse items.

As depicted in Table 3, the results were categorised based on four subsets of the A-CALL questionnaire. The questionnaire specified that with regard to the effectiveness of CALL versus non-CALL (4.45), most of the participants believed that EFL learning, supported by a computer (CALL), is more advantageous than learning in a non-CALL environment. Considering the surplus value of CALL (4.44), the participants believed that using the CALL software has additional advantages in comparison to traditional learning approaches and it can be a beneficial attachment to conventional classes. Moreover, the results for the teacher-influence subscale (4.14) indicated that the majority of the participants agreed on the fact that the role of teacher is influential in defining the attitudes of learners towards CALL environments. Furthermore, the results related to the degree of exhibition to CALL suggested that most of the participants (4.15) felt comfortable while using the CALL software.

Table 3. Descriptive statistics for four subscales of A-CALL questionnaire

Subscales of A-CALL questionnaire	Number of items	Mean
1. Effectiveness of CALL versus non-CALL	2,3,4 and 5	4.45
2. Surplus value of CALL	1,6,7,8,9,10,11,12,16 and 17	4.44
3. Teacher influence	13, 14 and 15	4.14
4. Degree of exhibition to CALL	18, 19 and 20	4.15

In addition to the A-CALL questionnaire, an online discussion forum was designed in order to gain a more in-depth insight into the attitudes of learners with regard to online EFL writing. Using a hard copy of the transcript from the online discussion forum, the analytical framework of Henri (1992), as a particular model for content analysis of computer-mediated communication, was employed on all the noted segments written by 30 students on the discussion forum. Each message was divided into a 'message unit' and a total of 128 message units were defined. A working definition of a 'message unit' referred to what represented one 'idea'. Then, the researcher coded each message unit according to the five dimensions that were defined by Henri (1992); these included type of participation, social, interactivity, cognitive skill and metacognitive knowledge and skill. All the comments were reanalysed by an independent coder for reliability checking and the interrater reliability was calculated to be 0.94, which indicated an excellent agreement between the raters. The mean of the ratings of the two coders was computed for each dimension. Using the model, five key variables were examined.

5. Type of participation

According to Henri (1992, p. 125), the participative dimension consists of the overall participation, which is defined as 'the total number of messages' and the active participation in learning process, which is 'the number of statements directly related to learning made by learners and educators'. The

results revealed that out of a total number of 128 message units presenting overall participation, 43 message units were statements connected to the formal content of the online writing system and could be regarded as active participation. Thus, it can be concluded that almost 34% of message units directly addressed the learning materials that were covered throughout the study period.

5.1. The social dimension

As Henri (1992, p. 126) pointed out, social presence is at work in any 'statement or part of statement not related to the formal content of the subject matter'. So, the frequency of socially oriented statements (e.g., 'I hope this type of learning becomes more common on different courses in my university') indicated that about 66% of the message units were considered to be social in nature. In addition to being classified as participative or social, a message unit can also be categorised into the following dimensions explained in the following subsections.

5.2. The interactive dimension

Using Henri's framework (1992, p. 127), an analysis of the message units revealed that 9% of the message units posted on the online discussion forum presented a pattern of communication and can be classified as interactive responses that indicate how students interact online in an electronic environment. Of these, 4% were classified as explicit interactions—'any statement referring explicitly to another message or person'—and 3% were implicit interactions—'any statement referring implicitly to another message or person'; 2% were classified as independent statements, where a case contained new ideas not related to previous statements in the forum. Of the explicit responses, almost 3% were commentaries following an expressed idea, rather than responses to the questions and 3% of implicit responses were also considered commentaries, rather than questions.

5.3. The cognitive dimension

Applying the classification of Henri's model (1992) for the cognitive and metacognitive dimensions, the researchers intended to document how electronic environments encourage cognitive and metacognitive processing. The results revealed that, expressed as a percentage of the total number of message units, approximately 17% of the message units were classified as either elementary clarification (introduce a problem, pose a question and pass on information without elaboration; e.g., 'such homework would be more useful if we could do less in a longer time') or in-depth clarification (analyse a problem and identify assumptions; e.g., 'writing on a paper forces us to improve our spelling but using a computer's auto correction feature makes us lazier about spelling'). The inference category that reflected evidence of inductive or deductive reasoning based on evidence from prior statements or generalising was reported to be 16% of the total number of message units (e.g., 'this form of learning has additional advantages to traditional classroom and it makes learning faster and easier'). The judgment category was mainly concerned with making decisions, statements, appreciations, evaluations and criticisms, which accounted for almost 34% of the total discussion (e.g., 'typing made the writing process easier for me and it was much easier to check spelling as well' or 'in an electronic environment, we have access to online dictionaries and thesaurus'). An analysis of the transcript with regard to the last category of the cognitive dimension called strategy (propose a solution and outline what is needed to implement the solution; e.g., 'but more lessons were needed for writing, such as teaching grammatical structures') resulted in 17% of the total number of message units.

5.4. The metacognitive dimension

Considering Henri's (1992, p. 132) categories of the metacognitive dimension, evidence of metacognitive knowledge refers to the following classes of knowledge:

[D]eclarative knowledge about the person (all that is known about the characteristics of humans as cognitive beings), the task (appreciation of the task and available information), and strategies (means chosen to succeed in various cognitive tasks).

These forms of knowledge were observed to be 4% of the total number of message units (e.g., 'but considering that by this method we can save time, I think it is more efficient'). Out of the total number of postings, 3% were judged to be relevant to the following categories of skills:

[M]etacognitive skills including planning (selecting, predicting and ordering an action or strategy), regulation (setting up, maintenance and supervision of the overall cognitive task), evaluation (assessment, appraisal or verification of one's knowledge and skills), and self-awareness (recognise and understand one's feelings and thoughts about the task)'(e.g., 'it is obvious that writing in an electronic way is better' or 'face-to-face communication is necessary for a second language learner to learn English better').

6. Conclusion and implication

This study analysed the attitudes of Iranian university EFL students towards the utilisation of CALL applications by an A-CALL questionnaire (Vandewaetere & Desmet, 2009), including four subscales to investigate how learners valued the integration of computer-based activities into their language courses. As claimed by these findings, Iranian language learners feel positively towards the computer-assisted (Uzunboylu & Cumhur, 2015) language instructions in general. The aforementioned finding is in alignment with other studies in the Iranian context, which used the A-CALL questionnaire to measure the overall attitudes of Iranian EFL learners towards CALL (Rahimi & Yadollahi, 2010) and noted that Iranian language learners revealed an overall positive attitude towards computer use in language learning. This is also in agreement with the study of Alemi and Alipour (2014), which indicated that Iranian EFL learners generally feel positive about the effects of CALL in language learning. Similarly, in other contexts, research findings by Ayres (2002) revealed that the application of CALL within the existing programmes of study ranked highly from the perspectives of learners. Alike other late reports, in the current study, therefore, the utilisation of computers as a support for language teaching and learning is evaluated to be an appropriate approach that is suited to the needs of language learners.

Moreover, a comprehensive analysis of the questions of the survey indicated that with regard to the subscales of the effectiveness of CALL versus non-CALL and the surplus value of CALL, students did not feel highly positively towards Items 2 (learning a foreign language assisted by a computer is not as good as learning it by oral practice) and 9 (computer-assisted language learning can stand alone). One thing that is clear from the data is that learners viewed CALL-based programmes as enhancing, but not as replacing their classroom-based instructions. In other words, CALL should not be described as a replacement or substitution for a classroom. This would match the opinion of Ayres (2002), who believed that learners do not see CALL as an alternative to traditional language classes but as an influential section of the course. These results are in accordance with the findings obtained by Lasagabaster and Sierra (2003), showing that students clearly see applications and software programmes as complementary tools in their language classrooms. With regard to the influence of the teacher, the opinions of the students in the present study coincide with the opinions obtained in the work of Vandewaetere and Desmet (2009), which stated that the role of teachers is vital in boosting the confidence of learners with respect to electronic instructions. Therefore, the familiarity of teachers with technological options and their decisions on how to utilise technology as part of their language-learning environments is acknowledged to be a key contributing factor to guarantee the motivation of students. With regard to the level of exhibition to CALL, in this study, the responses of the students matched the statement by Lasagabaster and Sierra (2003); they pointed out that students appreciated the CALL-based programme as a less stressful learning situation in comparison to traditional language classes. Thus, Iranian students believed that producing language output through

computer-based programmes can be undertaken with increased comfort in comparison to producing language output in classrooms.

The finding showing that Iranian university EFL students indicated overall positive attitudes towards CALL can be explained by the fact that the ubiquity of technology, the widespread desirability and use of computers and the incorporation of technological tools in people's lives have paved the way for language learners to utilise web-based language instructions in comparison to other traditional teaching methods. This might be the reason why we found an overall positive view towards the use of computers in Iranian learning contexts. In addition, given the fact that the typical nature of Iranian learners is generally shy and they are easily intimidated by producing English output in the classroom, they believed that the use of the CALL programme is essentially helpful, especially for introverts, who can undertake the task with increased ease.

In addition to the A-CALL questionnaire, a discussion forum was designed to provide language learners with opportunities to express their opinions of computer-based language instructions, and to explore their insights and impressions about online systems. For the purposes of the current research, Henri's framework (1992) proved to be an appropriate analytical tool which understood the attitudes of students towards CALL by studying their postings in the forum. The suitability of the framework chosen for evaluation lies in the fact that Henri's model provides a picture of the meta cognitive processes of individuals along with other dimensions.

In general, consistent with the findings by Hara, Bonk and Angeli (2000), the analyses of students' online postings indicated that in an electronic learning situation, language learners have significantly more time to discuss various features of a programme and make social and cognitive contributions to the programme. This can be explained by the assumption that in a CALL programme, learners are free from the restrictions of traditional classrooms.

An in-depth analysis of the type and nature of participation indicated that the forum was not often used for discussing materials that were included in the course. Tracking the pattern of the messages in the discussion forum showed that the highest number of postings was social in nature and concerned the fact that most statements were not associated with the formal content of materials. This can be attributed to the fact that young learners prefer to use online systems for communication. However, this is contrary to the results of the research conducted by McKenzie and Murphy (2000), in which only about 10% of the message units were considered to be social.

With regard to interactivity, the discussion forum was evidently not used for interaction, responses or commentaries as students were not responsive to the postings of their peers. A possible reason behind this might be because language learners generally prefer to receive feedback from an instructor, rather than peers. Moreover, discussions in the forum were considered to be cognitively rich, as evidenced by the majority of the comments posted in the discussion forum that was being obviously related to judgment, forming inferences and clarification. The most discussed subjects were identified practical problems, and proposed strategies and solutions to overcome problems, appreciation and criticism towards the different aspects of computer-based language programmes. So, content analysis suggested that language learners processed the programme from a highly cognitive level, which was in line with the findings of Hara et al. (2000).

To demonstrate the potential of Henri's approach (1992) and its suitability for the current study, metacognitive processing was also investigated. According to Henri (1992, p.131),

The metacognitive process is difficult to observe in a traditional learning situation but in a Computer Mediated Communication environment, however, the examination of transmitted messages can be a valuable source of information on metacognitive activities.

Although relatively infrequent, evidence of metacognitive activity was observed in the discussion forum, such as students' feelings associated with learning experiences, Henri (1992, p. 133) states that

'even if no metacognitive activity was noticed, one could not conclude that the students are weak in this area because it is impossible to reveal the totality of metacognitive processes'.

Thus, the analysis of the students' opinion in the A-CALL questionnaire sheds some light on the process of developing the ideal CALL software in Iranian EFL contexts. Furthermore, analysing the transcripts from the discussion forum provided useful information to the instructors and course organisers with regard to the ongoing improvement of online courses.

References

Alemi, M. & Alipour, M. (2014). The effects of electronic flash cards on productive vocabulary knowledge and learners' attitude toward CALL among Iranian EAP students (Unpublished master's thesis). Tehran, Iran: Sharif University of Technology.

Ayres, R. (2002). Learner attitudes toward the use of CALL. *Computer Assisted Language Learning, 15*(3), 241–249.

Fatemi Jahromi, S. A. & Salimi, F. (2013). Exploring the human element of computer-assisted language learning: an Iranian context. *Computer Assisted Language Learning, 26*(2), 158–176.

Hara, N., Bonk, C. J. & Angeli, C. (2000). Content analysis of online discussion in an applied educational psychology course. *Instructional Science, 28*(2), 115–152.

Henri, F. (1992). Computer conferencing and content analysis. In A. R. Kaye (Ed.), *Collaborative learning through computer conferencing. The Najaden papers* (pp. 117–136). London, UK: Springer-Verlag.

Lasagabaster, D. & Manuel Sierra, J. (2003). Students' evaluation of CALL software programs. *Educational Media International, 40*(3–4), 293–304.

Latif, F. & Lotfi, G. H. (2007). Iranian teachers' beliefs about the applications of CALL in language classrooms [Abstract]. In A. A. Rezaei (Ed.), *Proceedings of the fourth conference on issues in english language teaching in Iran (IELTI4)* (p. 76). Tehran, Iran: University of Tehran Press.

Marandi, S. S. (2002). Teaching english in the new millennium: CALL in Iran. In A. A. Rezaei (Ed.), *Proceedings of the first conference on issues in english language teaching in Iran* (pp. 205–220). Tehran, Iran: University of Tehran Press.

McKenzie, W. & Murphy, D. (2000). I hope this goes somewhere: evaluation of an online discussion group. *Australian Journal of Educational Technology, 16*(3), 239–257.

Rahimi, M. & Yadollahi, S. (2010). *Computer assisted language learning: Iranian students' attitudes*. In second Conference on Modern Instructional Methods. Tehran, Iran: SRTTU.

Uzunboylu, H., & Cumhur, M. (2015). The content analysis of the computer-assisted studies in mathematics education between the years 2009-2014/April. *International Journal of Learning and Teaching*, *7*(2), 62-72. https://doi.org/10.18844/ijlt.v7i2.170

Vandewaetere, M. & Desmet, P. (2009). Introducing psychometrical validation of questionnaires in CALL research: the case of measuring attitude toward CALL. *Computer Assisted Language Learning, 22*(4), 349–380.

Warschauer, M. & Healey, D. (1998). Computers and language learning: an overview. *Language Teaching, 31*(2), 57–71.