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FROM THE EDITOR

by **Jarosław Krajka**
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The recent days brought about good news proving increased recognition, visibility and academic prestige of *Teaching English with Technology, A Journal for Teachers of English*. The Polish Ministry of Higher Education and Science published an officially authorized list of academic journals together with points assigned to them on the basis of internationalization, recognition, bibliometrics as well as inclusion in international databases. The decision on which journals are included in the list and which are not, and also what point values are assigned to those which are included in the list, is crucial for all academics in Poland. It is on the basis of point rankings that the Ministry conducts evaluation of scientific merit of universities and grants them categories connected with funding.

It is my pleasure to inform that *Teaching English with Technology* has been included in the list with the 40-point ranking, which puts us well ahead of a number of journals not included in the list at all and a great deal of those with 20-point ranking. Hopefully, our hard work will lead to increase of the ranking, to the 70, 120, 140 or 200 level.

The current issue of TEwT addresses a number of topics of wide interest to international readership from different countries, which means it does not deal with local issues pertaining only to the country of its publication, Poland. It is interesting to see how the same technologies and technology-mediated classroom activities, procedures or techniques are perceived and used in different countries. Hence, **Dara Tafazoli, M.ª Elena Gómez Parra** and **Cristina A. Huertas Abril e**xplore the relationships of second and foreign language teachers' and students' attitudes towards Computer-Assisted Language Learning (CALL) in terms of their gender, age group, and educational level in two countries, Spain and Iran. It was interesting for authors to investigate whether the relationships from a developed country (Spain) and a developing country (Iran) are the same and to find out to what extent the findings of a research on a developed country can be utilized in a developing country and vice versa.

The examination of perceptions and attitudes is the topic of another article, "Learners' Perceptions and Attitudes towards L2 Vodcasting Tasks in an E-Learning Project" by **Sajad**

Faramarzi, Hossein Heidari Tabrizi and **Azizeh Chalak.** The authors aimed at exploring the use of vodcasting technology and the learners' perceptions and attitudes towards practicing L2 vodcasting tasks. As it appears, the vodcasting technology can change the studying habits of learners, facilitate the monitoring process and the assessment system, maximize cooperation among the learners, and improve the relationship between the learners and the instructor.

The interaction between L2 readers and the reading text equipped with four different annotations or glosses (text-only, audio-only, text-picture and audio-picture annotations) has been subjected to empirical research by **Alireza Karbalaei** and **Amaneh Zare.** The research proved that text-only and audio-only were more effective than other kinds of annotation and providing the new words whether in audio or text annotation during reading comprehension can help students to become more effective readers.

Assisting vocabulary acquisition with computer technology is the topic of the next article in the current issue, "The Impact of Asynchronous Computer-Mediated Instruction (CAI) on EFL Learners' Vocabulary Uptake across Different Proficiency Levels" written by **Zahra Fakher Ajabshir** and **Karim Sadeghi**. The study investigated the effect of computer-assisted instruction (CAI) on adult second language (L2) learners' vocabulary recognition and production across high and low proficiency levels. The comparison of vocabulary recognition and production pretest and post-test scores revealed the significant effect of CAI on L2 learners' vocabulary uptake in the immediate and delayed post-tests.

The final article published in the July issue of *Teaching English with Technology* addresses the question of formative assessment. **David Kent** shows how *Plickers*, an SRS (Student Response System) application, can lead to increased engagement with content and reflection on learners' knowledge gaps.

We wish you good reading!

LEARNERS' PERCEPTIONS AND ATTITUDES TOWARDS L2 VODCASTING TASKS IN AN E-LEARNING PROJECT

by **Sajad Faramarzi, Hossein Heidari Tabrizi** and **Azizeh Chalak**
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Abstract

The Vodcasting technology has thrived as an auxiliary tool to support learners with supplementary materials. The current study aimed at exploring the use of vodcasting technology and the learners' perceptions and attitudes towards practicing L2 vodcasting tasks. For this reason, a sample of 120 Iranian EFL learners were selected and they received twelve weeks of treatment which included working on five different genres of vodcasting tasks. Participants received vodcasting tasks via Telegram application and were asked to do them in specific stages. In order to measure the participants' attitudes and perceptions, a learner engagement questionnaire was electronically distributed. The results revealed that the learners viewed the experience as significantly positive and constructive. It is concluded that the vodcasting technology can be executed independently as it can change the studying habits of learners, facilitate the monitoring process and the assessment system, maximize cooperation among the learners, and improve the relationship between the learners and the instructor.

Keywords: e-learning; listening comprehension; online learning; podcasting; video podcasts; vodcasting

1. Introduction

Recent technological improvements have drastically transformed the essence of pedagogical approaches in teaching skills and subskills. Listening, which plays a major role in second and foreign language acquisition, has undergone a metamorphosis of different changes regarding the way it has been implemented in both real and virtual classes. Several researchers (e.g., Baltova, 1994; Kellerman, 1990; Kellerman, 1992; Progosh, 1996; Shin, 1998; Sueyoshi & Hardison, 2005; Wagner 2010b) worked on different aspects of analyzing learners' abilities in both proficiency and achievement tests of listening by using different technologies like multimedia devices. These studies predominantly focused on analyzing different modalities of listening comprehension, investigating learners' needs, and analyzing their results in different testing conditions. Likewise, the learners' engagement and the rate of involvement has also

been a subject of several studies (Takeda, 2014; Wagner, 2007, 2010a). All of the above-mentioned studies have been conducted in conventional classroom environments where language learners had to practice listening programs in traditional classes and take the listening exams in a paper and pencil style. The requirement of such programs was obviously the real presence of learners and instructors throughout the whole study.

Nonetheless, the instructional technology has brought about tremendous variations to the style of second and foreign language teaching and learning, which gained massive popularity among students and educators (Faramarzi & Bagheri, 2015). It is assumed that the interactive method of presenting the teaching materials in virtual communities can diminish the affective barriers of traditional classes since learners have more time and space for preparation and self-correction (Read, 2007).

Accordingly, the podcasting system of delivering pedagogical materials can be used to alleviate the available challenges. The educational podcasting technology is defined as a method of presenting teaching/learning resources which can include a variety of different forms such as audio, video, or a synchronized version of both, PowerPoint Presentations, online applications, etc., to learners via constructing accessible RSS feeds (Takeda, 2014). In other words, it provides learners with an opportunity to have permanent access to major and supplementary materials regardless of time and space.

This technique has the potential to change the studying habits of language learners and encourage them to be more independent i.e. learners should no longer be worried about missing any particular session that corroborates the inherent significance of distance language learning per se. Therefore, by implementing this approach, a major sense of flexibility is established: ensuring the delivery of language learning materials and practicing them as much as needed (Abt & Barry, 2007; Armstrong, Tucker, & Massad, 2009; Ducate & Lomicka, 2009; Facer, Abdous & Camanera, 2009; Lord, 2008; McCombs & Liu, 2007).

However, the complete application of this technology in a pure distance language learning program requires more research and experimental studies. This high-tech development provides an opportunity for educators to fully operationalize and integrate listening, speaking, reading, and writing skills. Another rationale for choosing such an online device is its great potential for creativity and innovation that had received acclamation from some scholars (Elekaei, 2018; Faramarzi, 2018). The present study predominantly focused on analyzing learners' attitudes and feelings towards implementing vodcasting tasks ('VTs') in L2 listening instruction via an online platform. Therefore, the major aim of the study was to find out the students' attitudes and feelings towards different aspects of receiving the VTs.

2. Literature review

Using language materials in authentic situations has become a focal point in many methodological approaches including Task-Based Language Teaching (TBLT). This method highlights the use of tasks that are meaningful, challenging and reasonable. These tasks can motivate learners to engage in collaborative classroom activities (Bowen, 2010; Larsen-Freeman & Anderson, 2015; Willis & Willis, 2001). TBLT also encourages learners to develop critical thinking abilities. Similarly, technological advances which are popular nowadays can inspire learners to develop a cooperative spirit, minimize their affective barriers and, thus, facilitate the process of language learning (Faramarzi, 2018)

2.1. From podcasting to vodcasting in language learning classes

Different forms of visual modalities of listening comprehension have been previously investigated by different researchers (e.g., Abdous, Camarena & Facer, 2009; Berry, 2006; Chester, Buntine, Hammond & Atkinson, 2011; Copestake, 2006; Chan & Lee, 2005; Faramarzi, Elekaei, & Biria, 2015; Faramarzi, Elekaei & Koosha, 2015; Hargis, Schofield & Wilson, 2008; McGarr, 2009; O'Bryan, & Hegelheimer, 2007). Although different multimedia devices and file formats were used in these studies, the medium of instruction was the traditional classrooms in which students had to be physically involved in the language classes. Some researchers like McGarr (2009) believed that podcasting can be utilized as a substitutional device for learners to review the learning materials. In that research, 'creativity' and 'accessibility' were considered as the fundamental features of podcasting. The supportive supplementary feature of podcasting in instructional curricula was also investigated by Chi and Chan (2011). In this paper, the complementary use of podcasting was regarded as a great advantage during a three month-treatment of practicing podcasting by students of Korean.

However, some studies found that the use of podcasting does not lead to a higher performance in developing language skills. For instance, in a study on the effect of podcasting on vocabulary building, Palalas (2009) found that despite its overwhelming acceptability rate, the incorporation of this tool mostly resulted in rote memorization of words.

Nonetheless, some other studies underscored the positive effect of podcasting. Allan (2007) explored the adequacy of podcasting on vocabulary building by creating a podcasting website to provide a platform for students to internalize words. Moreover, the use of podcasting to develop grammar, listening comprehension, and cultural diversity was the focus of a study by Chan, Chen, and Dopel (2011). Students received a thirteen-week treatment period of getting 14 podcasting lessons. The results indicated the superiority of students' performance.

Increased performance of students was also demonstrated in a study by Ducate and Lomicka (2009). In that study, the use of integrated podcasting materials was investigated in real classrooms. It was concluded that students performed outstandingly better as soon as they started downloading the podcasts to their personal computers.

In a comparative study, Lowman (2014) compared the use of podcasts and vodcasts in vocabulary development. It was concluded that the vodcasts group significantly outperformed the podcast one in both receptive and expressive skills. Additionally, Litchfield, Dyson, Wright, Pradhan and Courtille (2010) highlighted the superiority of vodcasting tasks in improving multimedia communication skills and raising the students' awareness about the potentials of the vodcasting technology. Furthermore, Sadeghi and Ghorbani (2017) found that implementing TED vodcasts had a significant effect on oral proficiency of Iranian EFL learners. In a different study, Faramarzi, Heidari Tabrizi, and Chalak (2019a) investigated the effect of video podcasting tasks on listening comprehension progress of the Iranian intermediate learners. The results indicated the superior performance of the students which was supported by a statistically significant increase in listening comprehension scores from pretest to posttest.

Although the literature review provides a predominant compromise on the positive impact of podcasting, most of the above-mentioned studies have different inadequacies like following a single-shot design, a short treatment period and small population size.

2.2. Learner's attitudes towards podcasting

The supplementary use of podcasting has received mixed reactions in former studies. Different criteria have been investigated in former academic treatments. Chan, Chi, Chin, and Lin (2011) examined the motivating effect of podcasting on students' feelings and perceptions and significant positive results were found as regards the motivating role of podcasting. Students were unanimous about its constructive effects and demanded to continue the same experience.

Similarly, in another study which was carried out on the impact of podcasting on teaching Spanish, Martin and Beckmann (2011) examined the ongoing use of podcasting technology during a four-year longitudinal program. Major sense of satisfaction and high approval rate were vastly observed by the students.

Today's hectic lifestyle obliges people to be in rush all the time and the occupational concerns minimize the amount of quality time to be spent on language learning. Podcasting has changed the studying pattern of learners. Berry (2006) accredited podcasting with different features such as "its portability, intimacy, and accessibility"

Supporting pedagogical and academic purposes is also an issue of prime importance. According to Hargis and Wilson (2005), "podcasting can promise a unique approach in improving foundational pedagogical approaches to information processing and conceptual learning" (p. 6). As any new teaching/learning style can be threatening for learners, Hargis and Wilson's study highlights the role of training language learners before introducing this method into the educational system.

The podcasting technology which involves a user-friendly approach to receive the instructional materials can be considered as one of the prime reasons why it removes the affective barriers. For example, Chan and Lee (2005) argued that podcasting can considerably minimize the level of anxiety. Similarly, William and Michael (2007) demonstrated that 71% of students who reviewed the podcasting materials regularly regarded this experience as comfortable and user-friendly. Their reasons are also worth mentioning. The majority of participants chose this method because of interference of language classes with other classes and, as a result, no class is to be missed by subscribing to a particular podcasting channel.

Problem-solving has also been reflected as an important aspect of podcasting technology. Muppala and Kong (2007) revealed that they received excellent feedback from the students concerning the areas that they experienced difficulty with. As a result, it can be considered as a nice strategy to screen the students' progress.

Moreover, the online setting is a great asset for this innovation since it diminishes the physical distance between the instructor and the learners and also among the peers (Bolliger, Supanakorn, & Boggs, 2010). The interactive environment provided a great venue to negotiate meaning. Therefore, the students' involvement and participation can be maximized when there is a simple procedure to do it in virtual communities.

Nevertheless, like any other pioneering method, vodcasting can be the target of criticism. As an example, Read (2007) mentioned that the starting point should be very easy and comprehensible for all learners. As far as foreign language learning is concerned, this kind of technology can be very rewarding for non-native students who cannot adapt themselves with the pace of instruction (Muppala & Kong, 2007).

All in all, the attitudes towards the podcasting technology in language learning programs have been mostly positive. As an example, Chester et al. (2011) compared podcast users with non-users and stated that those who spent time reviewing podcasts had a higher level of self-efficacy. Podcasting users referred to the usefulness and convenience of the presented materials as an adjunct tool to catch up with the pace of instruction. Nonetheless, the non-users

had their own reasons for evading the technology as many of them preferred real face-to-face interaction with their teachers and classmates in the classroom environment.

Unlike the above-mentioned studies which mainly focused on the supplementary use of podcasting technology without having a specific justification of adherence to a particular language learning theory, this study particularly focused on the use of video podcasting in a complete distance language learning program. In other words, the whole process of assessment, delivery of vodcasting materials, interaction with the participants, distribution of the electronic version of the questionnaire, technical troubleshooting, and getting feedback from the participants were all conducted in an e-learning environment.

3. The study

3.1. Design, participants and setting

The present study employed a pre-experimental design to collect observational and attitudinal data. Since the long-term effect of the treatment was of prime importance, one homogenous group was chosen to measure the effect of treatment. For this aim, 120 undergraduate male and female students of English translation program, aged 18 to 30, from Karaj Branch of Azad University in Iran were selected. Since the intermediate learners were needed, the participants were selected based on the results of a TOEFL iBT placement test which required them to receive 60 points out of 120 according to the criteria of Common European Framework of Reference (CEFR). The TOEFL iBT test was chosen for the placement test mainly because it could be administered in a computerized version which was in accordance with the online nature of the study.

For this study, a nonrandom purposive sampling of participants was considered. This kind of sampling was preferred since the study had to focus on a particular group of students at the intermediate level of proficiency and test their development through the treatment period.

The participants were introduced to a teacher-made online group in Telegram application which had been initially established by the researcher. Furthermore, all the briefing sessions on how to contribute in that environment were explained in an online forum. Telegram is a free messaging service which works based on the cloud-based system and is capable of synchronizing encrypted data across a multitude of independent data centers. It is compatible with all major operating systems e.g. iPhone, Android, Mac, Linux, and Windows. Additionally, it can be easily used on Desktop computers.

3.2. Instruments and materials

The instruments which were used in this experiment comprised both learning instruments and the measuring devices.

Twenty video podcasting tasks together with their assigned exercises in form of question files were presented to the participants. The tasks were extracted from various resources including British Council's website, the Australian Network, and BBC documentaries. Each week the tasks comprised one grammar learning task, one vocabulary building task, two news tasks, one lecture task, and one documentary task. Therefore, a total of one hundred tasks was presented to the learners during the whole treatment. The number of tasks was considered to comply with the essential requirements of the ten-week treatment period. The video files and their exercises were designed to promote all major skills and sub skills. Besides, students had an opportunity to negotiate meaning in an interactive forum. The contextualized use of English was emphasized. The participants were also encouraged to practice note-taking in order to internalize the great aspects of vocabulary e.g. useful phrasal verbs, collocations, and idioms. The tasks were further designed to promote the informal aspects of English language as well as its academic use.

The process of sending and receiving the tasks was fairly simple. The students could receive them at any time and do the task in their convenient studying hours as the vodcasting files were ready to be downloaded and played at any time. Table 1 shows the frequency of these tasks in different weekdays.

Table 1. Timetable of different vodcasts during the week

Weekdays	Task type	Length in each week	Number of exercises	Sources
Saturdays	Grammar Vodcasts	10 minutes	20	British Council
Sundays	Vocabulary Vodcasts	10 minutes	20	British Council
Tuesdays	Documentary Vodcasts	20 minutes	10	Australian Network
Wednesdays	Lecture Vodcasts	10 minutes	10	Lecture Ready
Thursdays	News Vodcasts	10 minutes	10	CNN and BBC

The Telegram application was considered for this study because of many reasons. The first and the foremost determining factor is that since it is highly popular in Iran, people have access to many different channels through it. Moreover, it is fast and supports all major file formats. Above all, the security system is designed to exchange files without receiving any

spam from third parties. The useful telegram robots or 'bots' were considered to make many operations easier for the participants. Similarly, the researchers made the best use of data gathering robots like 'vote bot' to speed up the process of data collection. In fact, this environment cut down all the unnecessary paperwork, and the unnecessary participants' presence (Faramarzi, Heidari Tabrizi, & Chalak, 2019b).

The Learner Engagement Questionnaire was designed to discover students' precise needs and feelings which ultimately explored the potentials and challenges of the program. The classified version of the questionnaire enabled the researchers to find the required information. The learners filled out the questionnaire via an online robot with a fully computerized mechanism.

The participants' involvement and their attitudes and feelings towards the treatment were measured by a six-scale engagement questionnaire, which was distributed electronically via 'vote bot' in the main forum of Telegram. In this questionnaire seven major criteria were

1. the effectiveness of the vodcasting process in the treatment;
2. participants' degree of satisfaction in working with the vodcasting tasks;
3. participants' willingness to continue the process in a long term practice;
4. the presentation style of learning materials;
5. the degree in which the treatment made the participants independent;
6. the convenience and the accessibility of vodcasting tasks throughout the whole treatment process;
7. the appropriateness of the allotted time in doing the required assignments (see Appendix for the full tool).

For each criterion four different items were included which tapped the central measure of the required concepts. The internal consistency of the questionnaire was also measured using Cronbach's Alpha coefficient. Instead of sending doc files, the researchers made use of a voting robot system in which questions were presented to the participants on the main page of the channel and the responses were available in form of transparent tabs. The only burden to participate in the survey was a single touch on one of those tabs. Unlike the traditional questionnaires which were organized under a certain time constraint, the vote bot is very smart to change the votes, i.e. if you choose an alternative by mistake, or if you want to change your mind about a point, you can change the vote by touching another alternative to reverse the results which is impossible in the traditional type of questionnaires especially after submitting it. Moreover, unlike the traditional questionnaires, the physical presence of the subjects was not

necessary which signifies the virtual sense of e-learning. The admin user could update and terminate the results in the assigned time.

3.3. Data collection and analysis

Different vodcasting tasks were considered for this study. The researchers played the role of the admin user of the vodcasting channel and acted as troubleshooters in case anything unexpected appeared. First, a placement test was administered before starting the assignment to ensure the homogeneity of subjects. Then, the selected participants were invited to the Telegram channel as the major venue of education, which took two weeks. As long as the focus of attention was entirely on the effect of the treatment, only one homogenous group was considered. During the treatment process, the participants worked on different vodcasting tasks collaboratively (which took twelve weeks). In order to understand the participants' intentions during the treatment, the learner engagement questionnaire was conducted via the vote bot in the main forum of the channel. The data collection was made easy by getting the information from the vote bot results which took three days.

The attitudinal data were collected by analyzing the results of the questionnaire. The Learner Engagement Questionnaire (LEQ) was presented to the participants. Participants' attitudes in the questionnaire section were gathered in numerical values. The subjects pointed out their opinions about different criteria targeted in the questionnaire. The mean and the standard deviation of every question group related to the seven major criteria were investigated in detail. The questionnaire is available in the index section.

4. Results

Table 2 demonstrates the scores of each of thirty two items of the questionnaire on a 6-point scale (1-stronglydisagree, 2-disagree, 3-slightly disagree, 4-partly agree, 5-agree, 6-strongly agree) similar to the 6-point Likert Scale with four as the center point. According to Table 2, the mean scores above four reveal positive attitudes of the participants and those below four indicate negative attitudes of the participants.

Table 2. Questionnaire results indicating the participants' attitudes

Item	Mean	Standard Deviation	"Strongly Agree" Ratings	"Agree" Rating	"Partly Agree" Ratings	"Slightly Disagree" Ratings	"Disagree" Ratings	"Strongly Disagree" Ratings
1	5.09	0.94	32	30	11	7	0	0
2	4.95	0.91	25	31	19	4	1	0
3	3.81	1.05	4	14	36	16	9	1

4	4.76	1.25	29	22	16	8	4	1
5	4.81	1.04	23	29	21	5	1	1
6	5.14	1.08	37	28	8	4	2	1
7	4.33	1.22	17	17	28	12	5	1
8	4.54	1.04	18	21	28	12	1	0
9	3.38	1.44	6	11	24	15	14	10
10	3.49	1.23	3	11	32	16	12	6
11	4.56	1.48	28	21	12	10	5	4
12	5.14	1.09	36	31	6	3	3	1
13	4.71	1.09	20	30	22	4	3	1
14	5.40	1.03	49	24	2	1	3	1
15	5.49	0.84	52	19	6	2	1	0
16	4.99	1.08	33	22	19	4	1	1
17	2.29	1.27	0	6	8	19	17	30
18	4.94	1.01	25	35	13	4	3	0
19	4.99	0.98	28	32	12	7	1	0
20	4.91	1.23	31	32	14	2	1	0
21	2.49	1.33	1	4	18	11	22	24
22	4.35	1.22	17	17	30	12	1	3
23	4.86	0.86	20	33	24	2	1	0
24	2.76	1.40	0	11	18	12	19	20
25	3.90	1.21	9	15	27	18	10	1
26	4.58	0.99	14	30	27	6	3	0
27	5.06	0.95	32	27	16	4	1	0
28	5.01	1.07	32	29	9	8	2	0
29	3.36	1.33	3	17	16	19	20	5
30	5.40	0.77	43	28	8	0	1	0
31	4.34	1.40	22	18	15	17	6	2
32	5.50	0.84	52	20	6	0	2	0
	Total response		741	715	551	264	175	114

The mean of the overall questionnaire was 4.47 and the standard deviation was 1.05. It was vitally important to verify the reliability of the questionnaire since it was devised by the researcher. The internal consistency of the questionnaire was α = 0.98. Moreover, all of the items had item-total correlations greater than 0.4. Therefore, the questionnaire items were reliably measuring the same construct.

First, we are going to consider the questions related to participants' attitudes towards improving their skills (questions no. 1, 13, 14 and 16). The means of these questions were higher than the central point (mean = 5.09, 4.71, 5.40, 4.99 respectively) indicating that the attitude of the participants towards improving their skills was totally positive (overall mean = 5.04).

Next, if we consider the questions about participants' overall satisfaction towards the experiment (questions no. 11, 12, 26 and 31), we can see that the means of these questions were higher than the central point (mean = 4.56, 5.14, 4.58, 4.34) meaning that the participants' satisfaction towards the experiment was positive. Thus, the participants' satisfaction towards the experiment was totally positive (overall mean = 4.65).

In addition, the means for the questions about the participants' willingness to continue the project (questions no. 6, 15, 30 and 32) were also higher than the central tendency (mean = 5.14, 5.49, 5.40, 5.50) specifying that the participants' willingness to continue the project was totally positive (overall mean = 5.38).

Moreover, the questions about the participants' attitude towards the presentation style of the materials had higher means than the central tendency (mean = 4.33, 4.54, 4.86, 3.36) revealing that the participants' attitude towards material presentation was positive (overall mean = 4.27).

Next, the questions about the participants' attitude towards independence and interaction with other members (questions no. 2, 18, 19 and 28) also showed higher mean cores than the central tendency (mean = 4.95, 4.94, 4.99, 5.01) meaning that the participants' attitude towards independence and interaction with other members was totally positive (overall mean = 4.97).

A similar case was with the questions about the participants' attitudes towards the organization of materials (numbers 4, 20, 21 and 27). The means of three of these questions were also higher than the central tendency (mean = 4.76, 4.91, 2.29, 5.06) revealing that the participants' attitude towards the convenience of organization of materials was positive (overall mean = 4.97).

Finally, the questions about the participants' attitude towards the appropriateness of time (numbers 5, 10, 22 and 25) also reported higher means for two of these questions and the mean of one of the questions is slightly lower than the central tendency (mean = 4.81, 3.49, 4.35, 3.90) meaning that the participants' attitude towards the appropriateness of time was positive (overall mean = 4.13).

To wrap up, the participants' attitudes towards improving their skills, the presentation style of materials, independence and interaction with other members, the convenience of organization of materials, the appropriateness of time, the participants' satisfaction towards the experiment, and the participants' willingness to continue the project were the positive aspects yielded by the study.

5. Discussion

In any curriculum design and pedagogical approach, the learners' opinions outline the roadmap of any teaching learning program. Likewise, the success or failure of any program can be predicted from learners' perspectives.

The method of distributing the questionnaire which was done electronically made subjects more motivated and yielded more verifiable results. The Learner Engagement Questionnaire (LEQ) tapped into the features of the treatment which thought to be substantial in the final results of the treatment. The statistical analysis of the questionnaire demonstrated the predominant positive results for almost all the items.

The participants indicated that the vodcasting technology had enhanced their listening achievement as well as other skills such as pronunciation, note taking, and vocabulary use. These findings clearly support the results of the study made by Chan, Chen, and Dopel (2011), in which gains in terms of grammar, listening comprehension and cultural differentiation were observed. Students' feedback to lessons was positive and constructive.

In addition, the sense of satisfaction was also the topic of discussion as another major criterion. The learners talked about the user-friendliness of the application and the suitability of the electronic facilities. Furthermore, they had regarded the vodcasting experience as enjoyable and the presence of the instructor had also been a rewarding point. These conclusions support the results of the study made by Martin and Beckmann (2011), in which a great sense of satisfaction was observed. Moreover, it clearly corroborated the findings of William and Michael (2007), in whose study 71% of students who reviewed the podcasting materials regularly treated the experience as comfortable and smoothing.

Furthermore, a question which might be interesting for many scholars is whether the participants are willing to continue such a program so that the results of the research can be more justifiable. Almost all of the participants unanimously voted for the superiority of the long-term effect of the video podcasting technique. These concluding issues obviously confirm the findings of Facer et al. (2009), who showed the participants were very satisfied with their improvements in listening, reading, speaking, grammar, and vocabulary. In addition, these findings validated those of Khanghah and Halili's (2015) findings as they investigated the effectiveness of podcasting on vocabulary enhancement of Iranian students. The researchers emphasized the flexibility feature of podcasting and remarked that this is a tool which can assist the curriculum process more conveniently.

Also, the way the instructional materials were presented is worth mentioning. The participants were inquired about the presentation style of the podcasting tasks. The majority of the participants were satisfied with the number of video podcasting tasks during a week. Moreover, they confirmed that the tasks were challenging enough to cope with. The only item in this group which did not reach a consensus point was the compromise over the appropriate facilities for receiving the vodcasts. The sense of satisfaction goes in line with the findings of

Abdous et al. (2009), whose students were really confident about the incorporation of this technique since it made the materials more comprehensible.

Moreover, an integral point in many pedagogical approaches in distance language learning programs is to provide a path to make learners independent. Most of the participants acknowledged that the vodcasting tasks made them more independent. In fact, a student-centered atmosphere is only established when learners consider themselves as independent which fosters peer connection. These results are in accordance with the findings of Zarei and Ghasemi (2016), who focused on the suitability of podcasting technology on enhancing the collaborative spirit of students of psychology.

Furthermore, the students reported to be more confident and acquired a higher level of self-assurance, which was in line with Chester et al. (2011), whose students had developed a high level of self-efficacy. The results showed that students were more motivated and it confirmed the findings by Chan, Chi, Chin, and Lin (2011) in which significant positive results was found about the motivating role of podcasting.

One of the fundamental aspects of video podcasting is the flexibility in time and time management. Most of the learners strongly confirmed that the online environment made the learning process more comfortable. These results were in accordance with the findings of Chan and Lee (2005), who claimed that podcasting could considerably minimize the level of anxiety. Nonetheless, the integral issue of peer collaboration in this study rejected the findings put forward by Palalas (2009), who emphasized little peer connection among the participants in online environments.

6. Pedagogical implications for e-learning projects and curriculum developers

Participants' positive attitudes towards the program clearly demonstrated the superiority of this innovative technology, which indeed validated the appropriateness of using vodcasting tasks in a comprehensive e-learning platform. This kind of technology can change the presentation style of materials and consequently may influence the studying habits of the students. Considering the fact that podcasting technology has the capability of promoting integrative tasks, this technique can maximize the chances of having permanent access to online learning materials. Furthermore, the online tasks were designed to work on different skills simultaneously. Revision and making the best use of the online classes undeniably gave students the opportunity to work on all major skills and sub-skills. For instance, various online pronunciation checking applications and robots might significantly change the learners' opinions about language learning and also motivate them to achieve native-like pronunciation

ability. Students could check their understanding within a process-oriented approach and by getting help from each other. Additionally, the vodcasting tasks were designed to promote the cooperative spirit of the learners since they facilitated peer connection and highlighted the necessity of troubleshooting. While many people mistakenly assume that virtual societies undermine the role of the instructor, it was observed that it facilitated access to the instructor.

Working on vodcasting tasks can be considered as a unique approach which can change the curriculum design. As far as the mounting appeal over cyber education is concerned, this instructional design can easily demonstrate itself as a stress-free situation where everybody can express themselves clearly and without any trouble. Besides, the multimedia nature of the vodcasting tasks together with a wide range of assignments encouraged the learners to review the video materials frequently and thus maximize the amount of exposure to language learning materials. It can change the studying habits of the learners to make them more autonomous.

However, the process of working with podcasting technology in online environments is a time-consuming experience and it requires persistence. It is a reminder that instructors should be competent and trained to eliminate the potential problems. Additionally, it necessitates recruiting teaching assistants to solve the problems if a bigger population of learners is concerned. Also, positive results and a growing sense of satisfaction and confidence can only be obtained gradually. Likewise, care must be taken to choose the most appropriate types of tasks for the learners. In other words, the tasks must be motivating, challenging, logical and meaningful. Therefore, the mere selection of podcasting technology may not make any difference.

7. Final conclusions

It is remarkable that nowadays podcasting technology has become versatile and can be implemented over a variety of different devices e.g. laptops, personal computers, smartphones, etc. As far as evaluation is concerned, the process of dynamic assessment has been made much easier since devising and coordinating tests were made very convenient. Last but not least, learning is facilitated when students are satisfied with what they are doing. All in all, vodcasting technology has the potential to provide a better opportunity for learners to engage in different activities and learn new material in a creative manner.

In terms of promoting speaking, video podcasting technology can greatly change the spirit of how to speak in a communicative environment. Routine vodcasting materials may promote speaking fluency and such oral preparation steps as brainstorming. The effect of this

approach on fluency, accuracy, and the ongoing process of how learners can implement these things are also some potential sources for further examination.

Moreover, the dynamic computerized assessment can be measured and checked by getting help from video podcasting technology. Learners' progress can be examined by comparing the group of podcast users who undergo routine dynamic assessment system and those who might receive them in a traditional way. Finding different testing factors which might facilitate or inhibit the learning process in the podcasting environment can also yield interesting results by implementing different test types. Students can also make their own video podcasts, share them online, and get the feedback from the peers, which can be another interesting area to investigate.

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Appendix. Learner Engagement questionnaire (LEQ)

Questions:

1. Video podcasting experience could help me understand the listening skill in different situations better.
2. After following twelve weeks of practicing video podcasts, I feel more confident in listening tests.
3. Computers are better than any other device in language learning and other things.
4. In this experience I could manage my time to practice listening by listening to the files in my convenient hours.
5. To me, Twelve weeks of receiving online instruction was a good start.
6. Video podcasts motivated me to work on listening skill more.
7. I feel the number of video listening exercises were enough to practice during a week.
8. In my opinion, the tasks organized for these video podcasts were suitable and challenging.
9. Using Smartphones makes a lot of problems for people these days.
10. I believe, it took a long time to do the video podcasting tasks.
11. For me, downloading the video podcasts was easy and user-friendly.
12. I can say that the admin user was helpful throughout the experience.
13. As far as I remember about the experience, video podcasting exercises were helpful in practicing note-taking.
14. I think I could improve my pronunciation by watching and following the video podcasts.
15. I am interested in continuing the video podcasting experience in a long-term process.
16. According to my experience in this group, video podcasting materials were helpful in enhancing my vocabulary level.
17. Computer education is not necessary for people.
18. I suppose by following more of these video podcasting videos, I can improve my speaking ability by my own.
19. In my eyes, by watching the video podcasts, understanding the intonation and complicated speech patterns became easier.
20. I think practicing Listening skill by video tasks was easy to do at home.
21. I had a lot of problems with getting access to the video files and their tasks.
22. I think the length of video files were appropriate.
23. In my view, organizing the video podcasting materials in different days of the week made it easy to follow.
24. Video podcasts made me angry about myself.
25. Apparently, the time of doing some of the tasks were very short.
26. The available technological facilities were enough to get access to video podcasts.
27. The online environment was suitable to receive the podcasts.
28. The online environment provided a good opportunity to interact with other people.
29. I'm afraid we needed more facilities to get the video podcasts.
30. In my opinion, I can get better results in a long-term project by practicing video podcasts in an online environment.
31. Discussing the content of the video podcasts with my friends was an enjoyable experience.
32. I feel if I continue with this process, I can enhance my English abilities.

ATTITUDE TOWARDS COMPUTER-ASSISTED LANGUAGE LEARNING: DO GENDER, AGE AND EDUCATIONAL LEVEL MATTER?

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Abstract

The purpose of the present cross-cultural study was to explore the relationships of second and foreign language teachers' and students' attitudes towards Computer-Assisted Language Learning (CALL) in terms of their gender, age group, and educational level in two countries, Spain and Iran. The study was based on a sample of 318 language teachers and 307 language students in Iran and Spain. Data collection was carried out through two online questionnaires (108 items) for both teachers and students. To make a sound decision, the researchers decided to utilize the Delphi methodology, which was originally established in order to diagnose the beneficiary of technologies. In the data analysis phase, descriptive, t test and one-way ANOVA analyses were performed to find the answers of the research questions. The findings of the study revealed that there is no difference between the attitudes of Iranian and Spanish towards CALL in terms of gender, age and educational matter. Finally, pedagogical implications and recommendations for further research are presented.

Keywords: Computer-Assisted Language Learning (CALL); cross-cultural study; attitudes; gender; age; educational level

1. Introduction

The emergence of new technologies may lead to more effective teaching and learning in different fields of study. Teachers and learners of either a second or a foreign language are also aware of the current waves of technologies in their field. Hence, they should enhance their "Computer-Assisted Language Learning (CALL) literacy" (Tafazoli, 2014, 2017; Tafazoli & Gómez, 2017) to meet the criteria of 21st century educational needs. Lasagabaster and Sierra (2003) note that students are excessively engaged in using CALL, and teachers make gargantuan attempts to integrate CALL into their syllabus and curriculum. Therefore, forethoughtful teachers and students promptly recognize the urgency of improving their "CALL literacy".

A considerable number of studies focus on the applications of CALL in language classrooms (e.g. Chapelle, 2001; Gruba, 2006; Stockwell, 2012). Nevertheless, it should be taken into account that language teaching and learning processes could be moderated or controlled by individual differences (Ellis, 2006). In this light, one of the aspects of individual differences is attitude. Attitude is a conglomerate of cognitive, behavioral and affective components (Fishbein & Ajzen, 1975; Kiesler, Collins & Miller, 1969; Mantle-Bromley, 1995; Mantle-Bromley & Miller, 1991) which will be explained in next section. Regarding CALL, however, both teachers and students' attitudes towards innovative teaching methodologies and technologies is a must (Tafazoli, Gómez & Huertas, 2018) as their positive or negative attitudes and perceptions may have a significant impact on the failure or success of the language teaching and learning process (Lasagabaster & Sierra, 2003).

Although many scholars address teachers' and students' attitudes towards CALL (e.g. Bebell, O' Conner, O' Dwyer & Russell, 2003; Lam, 2000; Smith, 2003; Warschauer, 2003), several demographic features such as gender, age, educational level, etc. may also influence an individual's attitude. Whether the use of CALL may benefit every individual language teacher and learner, the relationship between attitude and genders, age groups and educational levels is vague. Moreover, scrutinizing the literature shows that most of the prior studies on attitudes towards CALL are explored within a particular culture and context, however, a cross-cultural dimension in such studies has been missed. A cross-cultural study is an effective way to explore the psychological traits (Matsumoto & Yoo, 2006) which can provide educational improvement (Stigler & Hiebert, 1999).

The present cross-cultural study aims to explore the relationships of second and foreign language teachers' and students' attitudes towards CALL in terms of their gender, age group, and educational level in two countries, Spain and Iran. The researchers seek to find these relationships from a developed country (Spain) and a developing country (Iran) in order to find out to what extent the findings of a research on a developed country can be utilized in a developing country and vice versa. In other words, in Western and European countries, extensive research examined the effectiveness of CALL but the results cannot be extrapolated to the Iranian culture based on their age, gender and/or educational levels.

Therefore, our study seeks to answer the following research questions:

RQ1: Is there any significant difference among the Spanish and Iranian language students' attitudes towards the use of CALL in terms of gender?

RQ2: Is there any significant difference among the Spanish and Iranian language teachers' attitudes towards the use of CALL in terms of gender?

RQ3: Is there any significant difference among the Spanish and Iranian language students' attitudes towards the use of CALL in terms of their age?

RQ4: Is there any significant difference among the Spanish and Iranian language teachers' attitudes towards the use of CALL in terms of their age?

RQ5: Is there any significant difference among the Spanish and Iranian language students' attitudes towards the use of CALL in terms of their educational level?

RQ6: Is there any significant difference among the Spanish and Iranian language teachers' attitudes towards the use of CALL in terms of their educational level?

2. Conceptual framework: The multicomponent model of attitude

In psychology, attitude is a way in which individuals express their favor or disfavor towards anything. The degree of favor or disfavor could range from extremely positive to extremely negative. Defining attitude is argumentative among scholars. As Eagly and Chaiken (1998) state, "attitude is a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (p. 1). However, in Wenden's (1998) perspective, attitude is a set of "learned motivations, valued beliefs, evaluations, what one believes is acceptable, or responses oriented towards approaching or avoiding" (p. 52). The multicomponent model of attitude proposed attitude based on three main domains: (1) cognitive, (2) behavioral, and (3) affective domain (Fishbein & Ajzen, 1975; Kiesler, Collins & Miller, 1969; Mantle-Bromley, 1995; Mantle-Bromley & Miller, 1991).

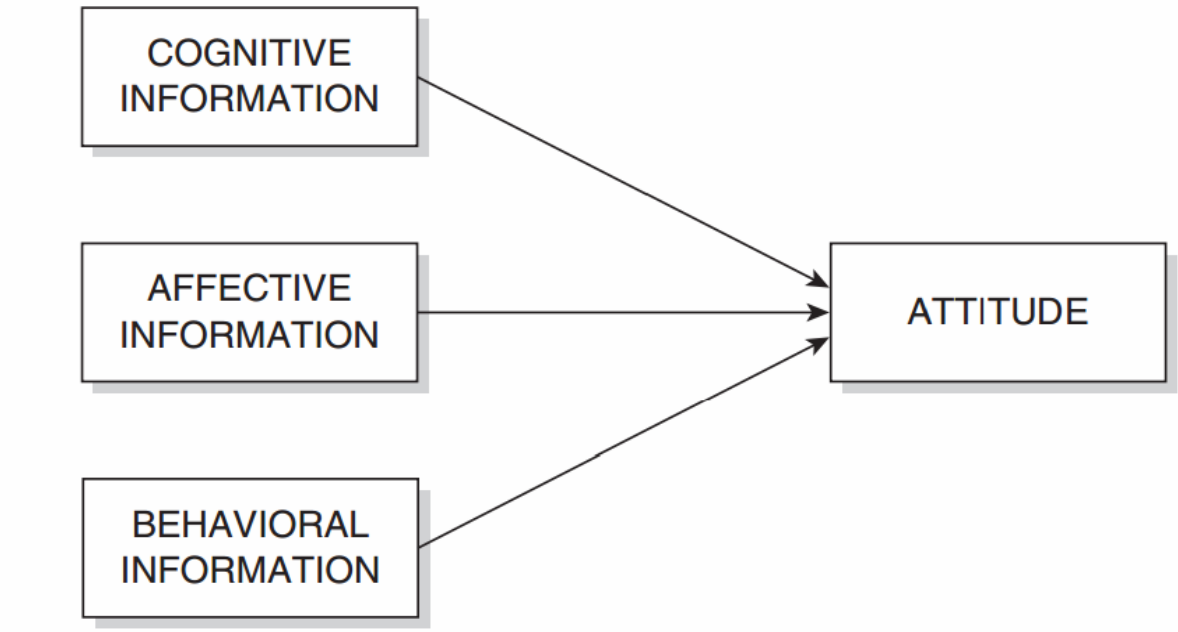

Figure 1. The Multicomponent Model of Attitude (Tafazoli, Gómez & Huertas, 2018, p. 40)

In the field of study of CALL, each domain of attitudes refers to a specific property. The cognitive component deals with the amount of knowledge a person has on a specific domain; in CALL, thus, the cognitive component relates to computer literacy (Maushak & Simonson, 2001). The second domain, the behavioral component, is an overt performance of a person towards an object. From the CALL point of view, this component refers to the experience of language teacher or learner in applying technologies in language teaching and learning. In other words, the more experienced one is in using computer, the more positive attitudes towards computers they display and vice versa (Maushak & Simonson, 2001). The third domain, the affective component, deals with an attitude object. Our feelings or emotions that are associated with an attitude object define the affective component. To put it simply, when a teacher assumed that a CALL tool (e.g. vodcast) made their teaching more effective, it deals with the affective component of attitude. Notwithstanding, all the components of the attitudes are not identical, they are interwoven, that is, they have a synergetic relation (Breckler, 1984).

3. Review of literature

In Spain, Pinto-Llorented, Sánchez-Gómez, García-Peñalvo and Casillas-Martín (2017) quantitatively scrutinized the students' attitudes and perceptions towards asynchronous technological tools (podcast, vodcast, online tests, online glossary and forums). 358 students (male: 23.2%, female: 76.8%) ranged in age from 20 to 58 were recruited to participate in this study. The researchers applied questionnaires as a pre-test (36 items) during the first week of the semester and post-test (39 items) during the last week of the semester included open/closed, yes/no and Likert Scale items which were posted on the Virtual Learning Environment (VLE). The findings confirmed the positive attitudes and perceptions of students towards applied asynchronous technological tools. Pinto-Llorented et al. (2017) enumerated the following reasons for positive perceptions of students: 1) students' greater autonomy with technology, 2) providing a natural environment and authentic materials via VLE, 3) opportunity to have collaborative and independent learning through e-activities, 4) anytime and anywhere nature of the mobile learning devices, 5) motivational and interesting features of e-activities, and 6) continuous assessment and self-assessment properties of e-activities which give students necessary feedback based on their weaknesses.

In a cross-cultural study, Tafazoli, Gómeza and Huertas (2018) compared the attitudes of Iranian and non-Iranian English language students' attitudes towards CALL. The participants of this study were 415 students (Iranian: 34.7%, non-Iranian: 65.3%) from 61 countries around the world. The researchers used a convergent mixed methods design, and

applied an online 44-item web-based questionnaire as an instrument for data collection. The questionnaire consisted of five sections. In a quantitative phase, it included: background information, computer literacy, students' attitudes towards CAL (computer-assisted learning) and students' attitudes towards CALL; and in a qualitative phase, there are two open-ended questions. The findings of the study revealed that there were not any significant differences between the attitudes of Iranian and non-Iranian English language students toward the application of CALL. These authors decided to explore their research question in every construct of the study, and after applying the non-parametric test of Mann-Whitney, the researchers found:

> …significant differences between the computer literacy as well as between the attitudes of Iranian and non-Iranian English students toward CALL.... Thereafter, it could be argued that as far as computer literacy and attitudes toward CALL are concerned, statistically significant differences exist between the data drawn from Iranian and non-Iranian English students. The only construct on which Iranian and non-Iranian students did not report any significant difference was the general attitude towards CAL
>
> (Tafazoli, Gómez & Huertas, 2018, p. 48).

In Turkey, Öz, Demirezen and Pourfeiz (2015) conducted a study in order to find the relationship between computer literacy, attitudes towards foreign language learning and CALL. The participants (N = 123) of the study were requested to respond to two instruments of the study: 1) The Attitudes towards Foreign Language Learning (AFLL) Scale (Vandewaetere & Desmet, 2009), and 2) The Attitudes towards Computer-Assisted Language Learning (A-CALL) Scale (Vandewaetere & Desmet, 2009). The findings of the study, which support prior studies on attitudes towards CALL (i.e. Akbulut, 2008; Ayres, 2002; Mahfouz & Ihmeideh, 2009; Link & Marz, 2006; Öz, 2015) indicated the positive relationships between attitudes towards foreign language learning and attitudes towards CALL. As Öz, Demirezen and Pourfeiz (2015) indicated, "28% of attitudes toward[s] CALL could be predicted by attitudes toward[s] FLL" (p. 359). They concluded that attitude plays a significant role in order to improve second language learning programs and boost educational outcome.

In a global study, Lin, Warschauer and Blake (2016) explored language learners' attitudes towards a large Language Learning Social Network Sites (LLSNSs) (the focus of this study was on Livemocha) through a 23-item questionnaire. The study involved 4,174 Livemocha users as well as 20 individual case studies. The results of the study showed that the majority of the users strongly agreed (48%) and agreed (37%) that Livemocha increased their motivation and self-confidence. Furthermore, most of the users felt that communicating with

native speakers via SNSs is more comfortable than face-to-face communication. The findings revealed the general positive attitudes of language learners towards LLSNSs, however, the researchers suggested more support, guidance, and well-structured activities that can lead to success. The findings of the study are in line with Warschauer (1996a, 1996b) and Young (2003), who demonstrated online environments decrease affective factors such as anxiety. However, the findings were inconsistent with Stevenson and Liu's (2010) study, which reported on the hesitation of some users to use LLSNSs for making social interactions.

In another study in Turkey (Öz, 2015), the relationship between demographic factors (gender and age) and attitudes towards CALL was investigated. Among 128 undergraduate freshman students, 75% of them were female and 25% were male, and their age ranged from 18 to 22. The findings of his study revealed the fact that gender differences moderate on the students' attitudes towards CALL. However, in relation to students' perceptions of *effectiveness of CALL*, the findings indicated significant differences between genders in favor of females. On the other hand, male students' perceptions of *surplus value of CALL* were greater than females. The conclusion was that female students assumed learning through computers is more satisfactory. In addition, they believed CALL augments their language proficiency in comparison to traditional language learning. In contrast, male students thought that CALL is a beneficial extension of the conventional language learning. The findings of the study are identical to Fatemi Jahromi and Salimi (2013) but opposite to Akbulut's (2008) study, who showed no relationship between gender and attitudes towards CALL. Regarding age differences in the attitudes towards CALL, the results showed considerable differences among age groups of 18, 19, 20 and 22.

In Cyprus, Cavus (2011) conducted a study on 40 female students (43.01%) and 53 male students (56.99%) in order to find a significant difference between genders' perceptions of Mobile-learning and Learning Management System (LMS) through the use of an independent *t*-test. The findings revealed no significant difference among the students' attitudes in terms of gender category towards the integration of the new trend learning environment. The outcome of the study was consistent with Uzunboylu, Cavus and Ercag (2009) in the same country; and Wang, Wu and Wang (2009) and Yang (2012) in Taiwan. On the other hand, according to Taleb and Sohrabi (2012) in Iran and Khaddage and Knezek (2013) in Oman, female students were more positive towards M-learning rather than male students. Nonetheless, Uzunboylu and Ozdamli's (2011) study showed that male instructors had more positive attitudes towards M-learning than female ones.

In a cross-cultural study in Oman and the UAE Al-Emran, Elsherif and Shaalan (2016) investigated the attitudes of students and faculty members towards M-learning in the higher education context in terms of their age and gender. The number of participants in Oman were 225 students and 24 faculty members and in the UAE were 158 students and 30 faculty members. An independent *t*-test noticed no differences among both educators and students' attitudes towards M-learning in terms of their gender. The findings of this study was in opposite to a study conducted in Saudi Arabia by Alwraikat and Al Tokhaim (2014), in which the independent *t*-test indicated that female instructors were more positive towards M-learning than male instructors. Data analysis indicated no statistical differences among the students' attitudes between and within age groups.

The literature shows that most of the previous studies on attitudes towards CALL are explored within a context. Thus, in this study, the researchers tried to investigate second and foreign language teachers' and students' attitudes towards CALL in terms of their gender, age group, and educational level in two countries, Spain and Iran. The researchers sought to find these relationships from a developed country (Spain) and a developing country (Iran) in order to find out to what extent the findings of a research on a developed country can be utilized in a developing country and vice versa.

4. Methodology

4.1. Participants

The present study was based on a sample of 318 language teachers and 307 language students in Iran and Spain. As shown in Table 1, 50.94% of the teachers and 69.38% of the students were Iranian. Spanish teachers and students were 49.06% and 30.62% of the sample respectively. Moreover, female was the dominant gender in the sample with over half of the teacher participants (64.46 %), and over the three quarters of students (76.54); only 185 of the 625 participants of the sample were male.

Table 1. Distribution of participants based on their gender

Country	Gender	Teacher	Student
Iran	Male	69	42
	Female	93	171
	Total	162	213
Spain	Male	44	30
	Female	112	64
	Total	156	94

	Male	113	72
Total	Female	205	235
	Total	318	307

Table 2 shows that the distribution of BA, MA and PhD teachers were almost equal in the sample, although this distribution was not equal in student participants. The minority group in terms of education level was the PhDs who summed to 131 participants, while the major group was MA participants with 299.

Table 2. Distribution of participants based on their educational level

Country	Educational Level	Teacher	Student
	BA	25	106
Iran	MA	92	81
	PhD	45	26
	BA	25	39
Spain	MA	85	41
	PhD	46	14
	BA	50	145
Total	MA	177	122
	PhD	91	40

As far as age was concerned, as depicted in Table 3, the largest category of teacher participants (170 participants) fell within the age range of 36 and above. However, the category of 18 to 23 was the largest in student participants. On the other hand, the smallest groups in teacher and student participants were the category of 18 to 23 years old (2.51%) and the category of 30 to 35 years old (20.84%), respectively.

Table 3. Distribution of participants based on their age groups

Country	Age group	Teacher	Student
	18-23	8	79
Iran	24-29	30	50
	30-35	61	49
	36 and above	63	35
	18-23	0	20
Spain	24-29	15	21
	30-35	34	15
	36 and above	107	38
	18-23	8	99
Total	24-29	45	71
	30-35	95	64
	36 and above	170	73

4.2 Instrumentation

Data collection was carried out through two online questionnaires for both teachers and students. The survey in the form of a questionnaire is one of the most usual methods of data collection on attitudes and opinions in a large-scale research (Mackey & Gass, 2005). When language learners want to report on their beliefs and motivations or reactions about their language instructions, settings, activities, etc. researchers are able to use questionnaires. Phellas, Bloch and Seale (2011) mentioned some advantages of web-based (online) surveys:

> …(1) Web page surveys are extremely fast. (2) No cost is involved once the set-up has been completed. (3) You can show pictures, video and play sound. (4) Web page questionnaires can be set with skip instructions. (5) Web page questionnaires can use colours, fonts and other formatting options not possible in most email surveys. (6) A significant number of people will give more honest answers to questions. (7) People give longer answers to open-ended questions. (8) Survey answers can be combined with pre-existing information you have about individuals taking a survey
>
> (Phellas et al., 2011, p. 190).

The website which provides the platform for this online questionnaire is Google Forms (see https://bit.ly/2Knd7tJ for teacher tool and https://bit.ly/2M78INg for a student tool). The participants had access to the questionnaire via an online link. The online questionnaires comprised 108 closed- and open-item questions within four main sections and two constructs of including: 1) background information, 2) CALL literacy, and 3) participants' attitude towards CALL. The first section of the questionnaire intended to gather data about participants' background information: country, gender, age, educational level, language teaching and learning experiences, work/study place, familiarity and access to technology in the classroom. The second section aimed to investigate the CALL literacy. The third section was focused on the participants' attitude towards CALL through twenty-eight 5-point Likert-scale items, ranging from strongly disagree (1) to strongly agree (5). In the last section, ten open-ended items asked students about their experience with and attitudes towards CALL.

Table 4. Distribution of items on the questionnaires

Construct	Section I	Section II	Section III
Question type	Background information	CALL literacy	Participants' attitudes towards CALL
Total	14	56	38

4.3 Measurement analysis

To make a sound decision, the researchers decided to utilize the Delphi methodology, which was originally established in order to diagnose the beneficiary of technologies. The first draft of the questionnaire for this research was designed and emailed to 20 experts in the field. Due to the multidisciplinary nature of CALL, the researchers decided to arrange the panel of experts based on their expertise. Therefore, the panel consisted of twenty PhDs from different fields of Applied Linguistics, Computer Sciences, English Language Teaching, and Computer-Assisted Language Learning, from different parts of the world such as Iran, Spain, the USA and the UK, among others.

The data collection and analysis phase of the Delphi was guided by three issues: the discovery of opinions; the process of determining the most important issues; and managing opinions (Keeney, Hasson & McKenna, 2000). First, the researchers tried to discover the opinions to reach consensus on the content of the questionnaire. After gathering experts' opinions, data were analyzed through content analysis technique. At the end of three rounds, the researchers agreed on two parallel questionnaires.

The questionnaires contained 108 items, which measured two different constructs of CALL literacy and attitudes towards CALL. After administering this questionnaire to the teachers' sample, the researchers first checked the validity of the case processing. All the 318 cases of the sample were valid, and SPSS did not exclude the scores of any of the participants from the processing. Then, the researchers used SPSS to calculate the Cronbach's Alpha Coefficient which was .857 for 28 quantitative items of attitude towards CALL construct. This indicated that this construct enjoyed ample internal consistency. Moreover, the researchers calculated the reliability of the students' questionnaire. The internal consistency of the students' attitudes towards CALL construct enjoyed a high degree of internal consistency. The Cronbach's Alpha coefficient for this construct was .894 for 28 items.

5. Results and Discussion

RQ1: Is there any significant difference among the Spanish and Iranian language students' attitudes towards the use of CALL in terms of gender?

In order to find the answer, an independent sample of *t*-test was applied to find out if there is any statistical significant difference among Spanish and Iranian language students' attitudes towards the use of CALL in terms of gender.

Table 5. Differences among students' attitudes in terms of their gender

	Gender	N	Mean	Std. Deviation	Sig.	t	df
Attitude	Male	72	100.8611	14.033467	.476	.294	305
	Female	235	100.2809	14.840097			

As depicted in Table 5, the results indicate that the mean values for both male and female students do not show any significant differences among Iranian and Spanish students' attitudes towards CALL in terms of their gender. The calculated value of t is (.294) and the significance level is (p = 0.476, p > 0.05). This could imply that both male and female students have the same attitudes towards CALL which emphasize the positive role of CALL in sexual justice in educational system of both contexts, Iran and Spain. The finding of this research question is in line with other studies such as Al-Emran, Elsherif and Shaalan (2016), Cavus (2011), Tafazoli, Gómez and Huertas (2018), Uzunboylu, Cavus and Ercag (2009), Wang, Wu and Wang (2009), and Yang (2012), however, it is in contrast to Fatemi Jahromi and Salimi (2013), Khaddage and Knezek (2013), Öz (2015), Taleb and Sohrabi (2012), and Uzunboylu and Ozdamli (2011).

RQ2: Is there any significant difference among the Spanish and Iranian language teachers' attitudes towards the use of CALL in terms of gender?

Another independent sample of *t*-test was carried out to investigate if there is any statistical significant difference among Spanish and Iranian language teachers' attitudes towards the use of CALL in terms of gender.

Table 6. Differences among teachers' attitudes in terms of their gender

	Gender	N	Mean	Std. Deviation	Sig.	T	Df
Attitude	Male	113	99.0885	13.93259	.329	-.706	202.635
	Female	205	100.1854	11.92891			

As illustrated in Table 6, the results outlined no significant differences between Iranian and Spanish teachers' attitudes towards CALL in terms of their gender. The computed value of t is (-.706) and the significance level is (p = 0.329, p > 0.05). The finding of this research question shows that both male and female teachers have the same attitudes towards CALL. The finding is approved by other research in the field such as Akbulut (2008), Al-Emran, Elsherif & Shaalan (2016), and Öz, Demirezen & Pourfeiz (2015). In contrast, Alwraikat & Al Tokhaim (2014) claimed a significant difference among teachers' attitudes in terms of their gender.

RQ3: Is there any significant difference among Spanish and Iranian language students' attitudes towards the use of CALL in terms of their age?

To ascertain if there is any significant difference between the students' attitudes towards CALL with regard to their age, frequency, means and standard deviations for the students' age groups (i.e. 18-23, 24-29, 30-35 and 36 and above) are computed as shown in Table 7 and Table 8.

Table 7. Frequency of students' age groups

Age Groups	Frequency	Percent	Valid Percent	Cumulative Percent
18-23	99	32.2	32.2	32.2
24-29	71	23.1	23.1	55. 4
30-35	64	20.8	20.8	76.2
36 and above	73	23.8	23.8	100.0
Total	307	100.0	100.0	

Table 8. Mean and standard deviation for students' attitudes in terms of their age

	N	Mean	Std. Deviation
Age Groups	307	2.36	1.164

Furthermore, a one-way analysis of variance (ANOVA) was implemented to explore if there are any statistical significant differences between the mean scores. As displayed in Table 9, results demonstrated that there is no statistical significant differences ($p = 0.052$, $p > 0.05$) between the students' attitudes with regard to their age and the computed of F value is (2.604).

Table 9. ANOVA results for students' attitudes in terms of their age

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1647.230	3	549.077	2.604	.052
Within Groups	63887.402	303	210.850		
Total	65534.632	306			

Although Öz (2015) believed that there is a statistical difference between students' attitudes towards CALL based on their age, the finding of this question is consistent with Al-Emran, Elsherif and Shaalan (2016) and Tafazoli, Gómez and Huertas (2018) who reported no differences.

RQ4: Is there any significant difference among the Spanish and Iranian language teachers' attitudes towards the use of CALL in terms of their age?

To discover if there is any significant difference among the teachers' attitudes towards CALL with regard to their age, frequency, means and standard deviations for the teachers' age groups (i.e. 18-23, 24-29, 30-35, and 36 and above) are computed as shown in Table 10 and 11.

Table 10. Frequency of teachers' age groups

Age Groups	Frequency	Percent	Valid Percent	Cumulative Percent
18-23	8	2.5	2.5	2.5
24-29	45	14.2	14.2	16.7
30-35	95	29.9	29.9	46.5
36 and above	170	53.5	53.5	100.0
Total	318	100.0	100.0	

Table 11. Mean and standard deviation for teachers' attitudes in terms of their age

	N	Mean	Std. Deviation
Age Groups	318	3.34	.813

Furthermore, a one-way analysis of variance (ANOVA) was implemented to explore if there are any statistical significant differences between the mean scores. As displayed in Table 12, results demonstrated that there is a statistical significant difference (p = 0.028, p > 0.05) between the students' attitudes with regard to their age and the computed of F value is (3.077).

Table 12. ANOVA results for students' attitudes in terms of their age

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1452.568	3	484.189	3.077	.028
Within Groups	49405.145	314	157.341		
Total	50857.714	317			

In order to determine where the differences in mean scores occur, the Tukey test for *post-hoc* comparisons was used. Results revealed that there are no statistical differences among the students' attitudes between and within age groups (Table 13). This could be attributed to the fact that the age factor is distributed across four groups (18-23, 24-29, 30-35, and 36 and above). Therefore, it is very difficult to determine where the difference may occur.

Table 13. Post-hoc Tukey test for students' attitudes towards CALL on age groups variable

		Mean Difference			95% Confidence Interval	
(I) Age	(J) Age	(I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
18-23	24-29	-3.85556	4.81291	.854	-16.2865	8.5754

	30-35	-6.32105	4.61778	.520	-18.2480	5.6059
	36 and above	-1.61176	4.53797	.985	-13.3326	10.1091
24-29	18-23	3.85556	4.81291	.854	-8.5754	16.2865
	30-35	-2.46550	2.26995	.698	-8.3284	3.3974
	36 and above	2.24379	2.10286	.710	-3.1876	7.6751
30-35	18-23	6.32105	4.61778	.520	-5.6059	18.2480
	24-29	2.46550	2.26995	.698	-3.3974	8.3284
	36 and above	4.70929*	1.60679	.019	.5592	8.8594
36 and above	18-23	1.61176	4.53797	.985	-10.1091	13.3326
	24-29	-2.24379	2.10286	.710	-7.6751	3.1876
	30-35	-4.70929*	1.60679	.019	-8.8594	-.5592

RQ5: Is there any significant difference among the Spanish and Iranian language students' attitudes towards the use of CALL in terms of their educational level?

The researchers used an independent samples *t*-test in order to find out if there is any statistical significant difference among the students' attitudes towards CALL with regard to their educational level (BA, MA, and PhD). As illustrated in Table 14, results demonstrated that the there is a statistical significant difference among students' attitudes in terms of their educational level ($p = 0.028$, $p > 0.05$).

Table 14. ANOVA results for students' attitudes in terms of their educational level

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1528.034	2	764.017	3.629	.028
Within Groups	64006.598	304	210.548		
Total	65534.632	306			

To delve into this matter further, the researchers decided to perform the Tukey test as the *post-hoc* analysis. The Tukey test, as illustrated in Table 15, did not report any significant differences among the attitudes of different educational level towards CALL.

Table 15. Post-hoc Tukey test for students' attitudes towards CALL on educational level variable

(I) Academic Degree	(J) Academic Degree	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
BA	MA	-3.99294	1.78548	.067	-8.1982	.2123
	PhD	-5.48814	2.56855	.084	-11.5377	.5614
MA	BA	3.99294	1.78548	.067	-.2123	8.1982
	PhD	-1.49520	2.61937	.836	-7.6645	4.6741
PhD	BA	5.48814	2.56855	.084	-.5614	11.5377
	MA	1.49520	2.61937	.836	-4.6741	7.6645

RQ6: Is there any significant difference among the Spanish and Iranian language teachers' attitudes towards the use of CALL in terms of their educational level?

A one-way analysis of variance (ANOVA) was executed to investigate if there are any statistical significant differences between the teachers' attitudes in terms of their educational level. As demonstrated in Table 16, results revealed that there is no statistical significant differences ($p = 0.286$, $p > 0.05$) between the teachers' attitudes with regard to their educational level.

Table 16. ANOVA results for teachers' attitudes in terms of their educational level

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	402.466	2	201.233	1.256	.286
Within Groups	50455.248	315	160.175		
Total	50857.714	317			

On the one hand, the findings of this question are in line with Al-Emran, Elsherif and Shaalan (2016) who studied the faculty members' attitudes towards M-learning in terms of academic rank. On the other hand, an ANOVA test on Saudi Arabian faculty members' attitudes towards M-learning showed that young teaching assistant with lower rank were more positive than academic staff of higher ranks (Alwraikat & Al Tokhaim, 2014).

6. Conclusion

The evolution of educational technology in general, and Computer-Assisted Language Learning (CALL) in particular, has had a vital impact on language teaching and learning. This paper tried to accentuate the state-of-the-art in educational technology regarding teachers and students' attitudes towards CALL. The main aim of this study was to investigate Iranian and Spanish teachers' and students' attitudes, which, in turn, may support the decision makers of these two countries language educational organizations in the process of designing, integrating and utilizing the required CALL infrastructure, materials and tools. In this study, different variables such as gender, age and educational level, have been taken into account while investigating those attitudes.

According to the findings of this study, all the calculated factors (gender, age and education level) had no relationship to the attitudes of language teachers and students towards CALL. These findings may indicate that most language teachers and students understand the critical role of CALL in their professional and daily lives. Designing, developing and applying CALL materials and tools in language educational settings is inevitable, and the new trend of

language teaching and learning through technology among teachers and students (which this study has documented) is to use these materials and tools extensively.

Within the field of CALL, there are many areas of research, but this study has emphasized the role of demographic features on how language teachers and students appreciate the use of CALL in educational contexts. We would like to suggest some action research-based studies that we believe our results may not be appropriate to all CALL related contexts. The success of CALL in other contexts, from Eastern to Western countries, may lead to different results. Hence, we recommend further research into investigating what specifically second and foreign language teachers and students need to integrating CALL in their language environments.

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A COMPARISON OF THE EFFECT OF TEXTUAL, AUDIO AND TEXTUAL-PICTORIAL AND AUDIO–PICTORIAL ANNOTATIONS ON ENHANCING READING COMPREHENSION AMONG IRANIAN EFL LEARNERS

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Abstract

This study aimed to investigate the interaction between L2 readers and the reading text equipped with four different annotations or glosses including text-only, audio-only, text-picture and audio-picture annotations. The participants in the study were selected from four intact classes consisting of 100 students studying English at intermediate level in Kish Institute of Science & technology (*olom va fonon*), in Iran. After they were given a reading comprehension text, the four experimental groups were given the same reading comprehension texts with different annotations. Then, they were asked to take the same reading test as posttest.

The results of the study demonstrated that text-only and audio-only were more effective than other kinds of annotation. The results suggested that providing the new words whether in audio or text annotation during reading comprehension can help students to comprehend reading in an effective way. Educational implications suggest that provision of different kinds of glosses is beneficial for L2 students although they need some scaffolding for utilizing glosses in a beneficial way.

Key words: textual annotation; audio annotation; textual-pictorial annotation; audio-pictorial annotation; reading comprehension

1. Introduction

One of the most inspiring questions posed in the field of foreign language (L2) teaching by Alderson (1984) was whether the obstacle that readers encountered when reading in L2 was a reading problem or a language problem. Consequently, many studies have explored the extent to which first language (L1) reading proficiency and L2 linguistic competence affect L2 reading comprehension. The results suggest that both factors influence L2 text comprehension (Taillefer & Pugh, 1998). In addition, empirical studies reveal that reading skills are

transferable, interdependent, and universal across languages (Goodman, 2003; Tang, 1997). In other words, what readers master when reading in their LI can be transferred to their L2 reading (Cummins, 1991). However, this transfer happens under one condition: readers' L2 linguistic knowledge has to reach a certain threshold. Otherwise, their limited control over their L2 will interfere with the transfer of L1 reading skills (Clarke, 1980).

Researchers have identified vocabulary knowledge as one of the significant features of the required threshold for L2 linguistic abilities (Brisbois, 1995). This seems to be true with both adult (Koda, 1993; Ulijn & Strother, 1990) and younger learners (Schoonen, Hulstijn, & Bossers, 1998). The question is, thus, "What is the level of this vocabulary threshold?" Laufer (1989) found that if the lexical coverage of academic prose was 95% or above, the likelihood for L2 readers to comprehend the text was significantly high. Other studies revealed that for unassisted reading for pleasure, L2 readers needed to know about 98% of the running words in the text (Groot, 2000; Nation, 2001). In sum, the threshold of L2 vocabulary knowledge that allows L2 readers to be able to comprehend authentic materials successfully is between 95-98% depending on the types of texts.

Such high demand for vocabulary knowledge causes a critical problem for L2 readers. The way L2 readers acquire words is different from that of native speakers. LI readers acquire words incidentally in their natural environment.

Researchers have been encouraging the use of authentic texts to teach L2. Krashen (1992) contends that extensive exposure to authentic materials increases vocabulary development as well as reading comprehension among L2 readers. However, authentic materials are written to convey information, not to illustrate the meanings of unknown words. Hence, they contain many low-frequency words unfamiliar to L2 readers. Contextual inference of unknown words is not helpful either since it is possible only when the context is well comprehended, and often context is not very rich. Therefore, the Matthew effect (Stanovich, 1986) occurs; that is, only learners who have reached the threshold of vocabulary knowledge benefit from the extensive exposure to authentic materials.

What happens to readers whose L2 linguistic competence has not reached the required threshold? Various methods are used to help ease this lexical burden for L2 learners while encountering authentic L2 reading materials. One of the most widely used tools is the dictionary. However, dictionary use can be distracting and often learners spend more time reading texts using dictionaries than reading texts without them. In addition, a study by Luppescu and Day (1993) revealed that dictionaries seemed to have a confusing effect on

readers in many cases. When more than one meaning was provided, some L2 readers were unable to select the right meaning of the word.

Apparently, L2 readers need special training in dictionary skills (Nation, 2001). The other two options to help L2 readers overcome the high demand of vocabulary knowledge so that they can read authentic texts successfully are to syntactically simplify the texts and to provide glosses – meanings of words – in the margins of the texts. A study by Ulijn and Strother (1990), however, disclosed that syntactic simplification had no effect on reading comprehension. Furthermore, changing the structure of the texts makes them inauthentic and probably less coherent, which can affect L2 readers' text understanding.

Therefore, the second option - the provision of vocabulary glosses - seems to be a better choice because it does not affect textual structure and so maintains the authenticity of the texts. Unlike dictionaries, glossing provides accurate targeted meanings of unknown words that may be difficult or impossible to guess from the context, so authentic texts can be used. According to Nation (2001), glossing allows L2 readers to follow the text with very little interruption. Moreover, it increases L2 learners' independence since they do not have to rely on teachers to provide meanings for unknown words (Stewart & Cross, 1991).

Despite the wide use of marginal glosses in L2 texts and the high acceptance of glosses among L2 teachers and L2 learners, empirical studies yield conflicting results regarding the effects of glossing in printed texts on L2 vocabulary recall (Hulstijn, Hollander, & Greidanus, 1996; Ko, 1995) and on L2 reading recall (Luo, 1993; Roby, 1991).

The current generation of computer technology amplifies this line of research. The use of multimedia technology such as audio, image, video, and animation in the design of glossing expands the provision of vocabulary meanings that match individual learning preferences. Nevertheless, empirical research regarding the effects of hypermedia glossing on vocabulary acquisition and reading comprehension, especially with L2 readers, is still at the beginning stage (Kamil & Lane, 1998). Similarly to the research about glosses in printed texts, the studies about the provision of glosses in hypermedia environments yield inconclusive results (Chun & Plass, 1996; Laufer & Hill, 2000). Moreover, there was little evidence regarding whether or not readers use glosses or how readers actually use them to enhance their reading comprehension despite the overwhelming preferences of users. The inconclusive results in empirical studies and the availability of hypertext and multimedia technology point to the need for more research on the utilization of glosses in L2 reading. The current study was an attempt to pursue this line of research.

On the other hand, second language (L2) learners at all levels are faced with the difficulty of learning vocabulary. For example, Nation (2000) suggests that a native speaker of English knows about 20,000 word families. This poses a challenging task for English as a Second Language (ESL) learners. However, vocabulary learning has long been neglected within the field of Second Language Acquisition (SLA).

Recent years have seen increased interest in L2 vocabulary research. One influential debate over the years is between incidental and intentional vocabulary learning. The distinction between the two learning conditions has been attributed to learning task, learner attention and the pedagogical context of the learning process (Read, 2004). Both approaches have been argued to contribute to the incremental learning of L2 vocabulary (Hulstijn, 2001).

L2 research has argued in favour of incidental vocabulary learning through reading (Nation, 2001). As Jacobs et al. (1994) states, this conforms to L2 learners' reports that vocabulary learning happens, in most cases, accidentally during reading or listening. However, L2 incidental vocabulary learning tends to be incremental and slow.

Annotation or gloss has been used as a standard feature in L2 reading materials to facilitate comprehension in which L2 vocabulary learning comes about as a by-product (Jacobs, Dufon & Fong, 1994). As an instructional intervention, an annotation draws learner attention briefly away from reading, and focuses it temporarily on the form and meaning of the annotated word, thus enhancing vocabulary learning and overall reading comprehension. This echoes the interactionist view of SLA (Long, 1996) and the depth of processing hypothesis.

The effects of text annotation on L2 vocabulary learning and reading comprehension have been examined by studies which produced mixed findings (Watanabe, 1997). According to Al-Seghayer (2001), different from the traditional marginal annotation, multimedia annotations can present vocabulary information in multiple modalities, such as audio (sound) and visual (text, picture and video).

Studies have examined the effects of different types of annotations on incidental L2 vocabulary learning, in particular, the use of picture annotation and video annotation coupled with text annotation (Al-Seghayer, 2001). These studies support dual-coding theory (Paivio, 1990) and confirm the cognitive theory of multimedia learning (Mayer, 2001) that maintains how meaningful learning engages learners in both verbal and visual cognitive processing systems. According to Yoshii (2000), dual annotation of text and picture or text and video are unanimously argued to be better than single annotations in facilitating incidental L2 vocabulary learning.

Studies in audio annotation have mainly engaged the use of pronunciation of the target words, and their findings are inconsistent (Yeh & Wang, 2003). Audio is a different sensory modality from visual modality, such as printed text and pictures, because audio is processed by the auditory working memory while printed texts and picture are processed by the visual working memory; thus it should be treated separately as to its effect on learning. Studies of audio annotation should include not only the pronunciation, but also the definition or meaning of the target words.

Furthermore, research suggests that the addition of an audio element to dual annotations does not seem to have a definite effect on L2 vocabulary learning (Yeh & Wang, 2003). One possible explanation is that the information delivered simultaneously through different modalities (audio, verbal).

Previous studies examined the effects of annotations on L2 vocabulary learning and reading comprehension. These studies have supported the effectiveness of annotations in facilitating L2 vocabulary learning. However, no study in second language acquisition has examined audio annotation in combination with text as a dual multimedia annotation type. To bridge this gap, the present study focused on this issue by comparing four types of annotation including audio-only, text-only, audio-picture, and text-picture annotation in their effects on L2 reading comprehension in Iranian EFL context.

2. Review of related literature

2.1. Picture annotation

Visual aids have long been assumed to be beneficial in second language learning. Tuttle (1975) argued that “foreign language students can benefit from many types of visual material… the still or flat picture can prove to be a rich resource in the foreign language classroom” (p. 9). The use of imagery representation of foreign words by actual objects was also claimed by Kellogg and Howe (1971) to be facilitative to children’s vocabulary acquisition in a foreign language.

Subsequently, a number of researchers have explored the effect of visual stimuli on L2 vocabulary learning and reading comprehension. Kellogg and Howe’s (1971) study compared written words and pictures as cues for oral acquisition of Spanish vocabulary by children. The pictures yielded faster learning of new words than the written stimuli and the effect was retained for longer as indicated by greater recall of words shown in pictures. Terrel (1986, cited in Kost et al., 1999) proposed that combining the form and visual representation of unknown

L2 vocabulary helped learners to acquire concrete ideas and references. In reviewing the techniques used in learning L2 vocabulary, Oxford and Crookall (1990) acknowledged the effectiveness of visual imagery and maintained that "[M]ost learners are capable of associating new information to concepts in memory by means of meaningful visual images, and that visual images make learning more efficient" (p. 17) and "the pictorial-verbal combination involves many parts of the brain, thus providing greater cognitive power" (p. 17).

In annotation studies, picture annotation has been used to clarify the meaning of those unknown words second language learners encounter in reading. According to dual coding theory, the way learners comprehend pictures differs greatly from that of comprehending textual information (Paivio, 1971). In other words, text is processed by the verbal cognitive subsystem, while a picture is processed by the non-verbal cognitive subsystem. Research has compared L2 vocabulary learning from text annotation, picture annotation, and a combination of text and picture annotation

2.2. Audio annotation

It is worth noting that little research has been done in audio annotation. Audio annotation gives pronunciation, sample sentence, definition or meaning of a target word in spoken form. It has never been studied separately from other annotation modes, but mostly as an additive component. The only format in which audio annotation has been studied is the pronunciation of target words. Findings on audio annotation are rather mixed and uncertain. On the one hand, Svenconis and Kerst (1995) suggested that the use of audio could significantly improve vocabulary learning, especially when coupled with a second technique such as semantic mapping. On the other hand, Chun and Plass (1996a, as cited in Yeh & Wang, 2003) challenged the effect of audio annotation. In addition, it seems that the addition of an audio component to other annotations is not effective (Yeh & Wang, 2003); instead it distracts learners' attention.

Chun and Plass (1996a) challenged the positive effect of audio annotation. In their study, an audio component was added to three different annotations types (text, text-picture, and text-video); that is, a German native speaker pronounced each target word. Of the three successive studies, participants from study 1 and 2 were asked to report their use of retrieval cues for vocabulary learning. Among the reported cues of text, picture, video and sound, sound was used the least as a retrieval cue, as shown by the percentage of correct answers on vocabulary test, 2.2% and 4.3% for sound cue in the immediate and delayed post-tests for study 1, and 0.6% in the immediate post-test for study 2. The authors suggested that the audio

component was not useful in learning vocabulary since it showed very limited importance as a retrieval cue.

In comparison to the use of word pronunciation in the above two studies, Yeh and Wang (2003) investigated the audio annotation in which a native speaker read the word, spelled the word and read the sentence that embedded the word. Three types of vocabulary annotation were examined: text annotation, text-picture annotation, and textpicture-audio annotation. Analysis of the participants' (82 Chinese EFL learners) performance on the posttests indicated that the text-picture annotation was the most effective for vocabulary learning, and the text-picture-audio annotation was the least effective.

Yeh and Wang (2003) offered three possible reasons for the relative ineffectiveness of text-picture-audio annotation. The first reason was L1 processing mechanism transfer – as claimed by Chen (1998, cited in Yeh & Wang, 2003), Chinese EFL learners used more visual strategies than English native speakers and were therefore less skillful in using the provided audio information. This was confirmed by high preference of visual learning style over low auditory learning style by the participants in the questionnaire data. Thus, Chinese students did not effectively process the information provided by the audio annotation. The second reason resided in the fast speech rate of the audio annotation. Coupled with the visual learning style of Chinese students, the fast speech rate distracted the participants and exceeded their listening proficiency. Finally, the combination of text, picture and audio failed to give participants enough time to process the available information.

2.3. Textual or pictorial glosses

Kost, Foss, and Lenzini (1999) conducted a study with English-speaking college students studying German (L2). The participants were divided into three groups reading a text in three different types of glosses: textual, pictorial, and both textual and pictorial. In a two-week delayed test, participants in the textual group and the pictorial group had a greater vocabulary loss than those in the combination group. However, participants in the combination group outperformed those in the textual group only in the picture recognition test, and they outperformed those in the pictorial group only in the word recognition test. The researchers concluded that accessing information triggered by pictures was more effective over time than retrieving information triggered solely by words.

In another study, Karbalaei, Sattari and Nezami (2016) compared the effect of text-picture and audio-picture multimedia annotations in second language vocabulary recall among

Iranian EFL learners. The results demonstrated that audio-picture annotation is more effective than text-picture annotation in facilitating immediate L2 vocabulary recall.

In addition, Huang (2014) studied the effects of multimedia annotation through the discourse scheme and summary writing through the grounding theory (Chang, 1997) on text comprehension. The results indicated that both multimedia annotation and summary writing had significant positive effects on learners' reading performance.

In summary, studies regarding glossing in printed texts lead to the following conclusions. With respect to L2 vocabulary learning, glossing leads to better performance than no-gloss condition (Hulstijn et al., 1996; Jacobs et al., 1994; Rashkovsky, 1999). Moreover, L2 readers' word retention lasts at least one to two weeks (Ko, 1995; Kost et al., 1999; Watanabe, 1997). In regard to L2 text comprehension, research suggests that glossing has a more positive effect on text recall than no-gloss condition (Davis, 1989; Jacobs, 1994; Leffa, 1992; Rashkovsky, 1999).

Regarding the effects of different types of glosses, there is a tendency that the given-meaning gloss has a more positive effect than the inferred-meaning gloss on both L2 vocabulary learning and L2 text comprehension (Mondria, 1996, cited in Groot, 2000; Watanabe, 1997). In addition, the combination of textual and pictorial glosses tends to have a better effect on L2 vocabulary learning than either textual or pictorial gloss only (Kost et al., 1999). Furthermore, the difference between the effects of using L1 glosses and the use of L2 glosses on L2 vocabulary learning was not conclusive (Jacobs et al., 1994; Ko, 1995). As for text comprehension, both the effects of L1 and L2 glosses on L2 readers' text recall were not significantly different. These results, however, were based mainly on recall and recognition tests and other types of measurements may yield different results.

3. The study

3.1. Research questions

The present study aimed to evaluate how textual and audio glosses affect reading comprehension, and whether textual-pictorial glosses and audio-pictorial glosses can play a significant role in enhancing reading comprehension. Finally, it sought to discover the effect of textual, pictorial, textual-pictorial, audio-pictorial glosses on L2 reading comprehension.

Based on the objectives of the study, the following questions were raised for further investigation:

1. Do textual glosses play any role in enhancing reading comprehension among Iranian EFL learners?
2. Do audio glosses play any role in enhancing reading comprehension among Iranian EFL learners?
3. Can textual-pictorial glosses enhance reading comprehension among Iranian EFL learners?
4. Can audio-pictorial glosses enhance reading comprehension among Iranian EFL learners?
5. Is there any significant difference among the effect of textual, audio, textual-pictorial, audio-pictorial glosses on L2 reading comprehension among Iranian EFL learners?

3.2. Participants

The participants in the study were selected from four classes including 100 students studying English in Institute of Science & Technology (Kish, Iran). Participants had a mean age of 24 and were at intermediate level as determined on the basis of their scores on the PET proficiency test. Those participants placed between one standard deviation above and below the mean were regarded as the main participants. Finally, 77 students were selected for the main procedure and data analysis based on the research question. Then they were randomly assigned into four experimental groups including the text-only group, the audio-only group, the text-picture annotation group, the audio-picture annotation group and the control group. Some of the students were excluded because of their absence during the implementation of one of the tests. Finally, 63 students were placed in the respective experimental groups and 14 in the control group.

3.3. Instruments of the study

General English Proficiency Test: The PET proficiency test was utilized as the instrument for assessing the participants' level of proficiency in English. This test comprised 30 multiple-choice of vocabulary, grammar, and reading comprehension items. The researcher piloted the test with 24 students of the same level and similar characteristics to those of the participants of this study. It should be mentioned that the reliability of PET proficiency test estimated by KR-21 (Kuder-Richardson) formula turned out to be .71, which is sufficient reliability.

Reading Material and Target Words: The reading text, "European Settlers of Australia," was selected based on three criteria including text length, syntactic complexity, and content. In terms of length, the text has 449 words (including the title). ESL students at the intermediate

level are comfortable with reading texts of this length and syntactic complexity. It consists of short, uncomplicated sentences and simple past tense is used throughout the text. There is an average of 6.8 sentences in each paragraph, and an average sentence contains 10.8 words. The percentage of simple sentences in the text is over 80%. With regard to the content, it seems reasonable to assume that EFL students knew more or less the same amount of general information about the European colonization of Australia and have comparable background knowledge of the reading text (i.e., since none has been to Australia and its history is foreign to all participants). The content of the text does not require any specific culturally-related knowledge.

The text selected for reading tells of the story of the European colonists in Australia in the 1800s. The text was given to experienced EFL instructors who teach intermediate reading/writing classes and was confirmed to be appropriate for intermediate EFL students. The 20 target words were all nouns. They were selected for frequency. Based on the word frequency corpora of Francis and Kucera (1982), the 20 target words have a mean of 12.7 per million words.

The reading text was modified into four different forms: a text-only annotation, an audio-only annotation, a text with text-picture annotations, and a text with audio-picture annotations. The 20 target words were highlighted in the selected texts.

Multiple-choice Reading Comprehension Test (RC): The reading comprehension text was comprised of 10 multiple-choice questions. For each question, the participant was asked to choose the best answers out of the four given options. The questions and choices were given to experienced EFL instructors for validation. The questions were confirmed to be easy to understand and reflective of main idea of the reading text.

Word Recognition Test (WRT): A correct choice received the score of 1 and an incorrect choice received the score of 0. The possible maximum score was 20 points (1 point x 20 words).

All the instruments can be found in Appendices.

3.4. Procedure

The reading passages used for the purpose of this study were designed by the researcher to help intermediate EFL students with vocabulary learning in order to comprehend reading better. The passages used in this study provided students with annotations for unknown words via four different modes including a text-only annotation, an audio-only annotation, a text with text-picture annotations, and a text with audio-picture annotations. The annotations were used to assist the learning of unknown words and understanding of the reading text.

In the reading passages provided for the four experimental groups, four different versions were used for the reading text. In the text-only group, the students were just provided with the definition of the unknown words in the margin as text-only annotation. Regarding the audio-only group, the students were provided with the audio file that described the unknown words during reading comprehension. In the text-picture group, a textual definition of the words together with a picture that describes the word was used. In the audio-picture annotation group, the students could see a picture that depicts the meaning of the word and hear an audio clip that explains the meaning of the word.

The study was conducted during the participants' regular class times, and required two consecutive 50-minute sessions. After selecting the main participants, the four classes were considered as the experimental group and one class was regarded as the control group. Then, all students in all groups were asked to answer the reading comprehension test as pretest. Afterwards, in the reading passages provided for four experimental groups, four different versions were used for the reading text. In the text-only group, the students were just provided with the definition of the unknown words in the margin as text-only annotation. Regarding the audio-only group, the students were provided with the audio file that described the unknown words during reading comprehension. In the text-picture group, a textual definition of the words together with a picture that describes the word was used. In the audio-picture annotation group, the students could see a picture which depicts the meaning of the word and hear an audio clip which explains the meaning of the word.

3.5. Results and findings

Research question 1: Do textual glosses play any role in enhancing reading comprehension among Iranian EFL learners?

Table 1. Mean gain scores for vocabulary knowledge among samples in textual gloss and control group

	Group	N	Mean	Std. Deviation	Std. Error Mean
Gain score	Textual	16	2.31	.793	.198
	Control	14	.86	1.231	.329

As it is evident from Table 2, there is a significant difference between gain score in textual group and control group in Iranian EFL context (t=-3.788; P= .001). In other words, as shown in Table 1, the participants scored higher (M=2.31, SD=.793) when they were exposed

to textual glosses during their reading than when they were not exposed to any kind of gloss (M=.86, SD= 1.231).

Table 2. Independent sample test for gain score in vocabulary knowledge for samples in textual and control group

		t-test for Equality of Means						
		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Gain total	Equal variances assumed	3.897	28	.001	1.455	.373	.690	2.220
	Equal variances not assumed	3.788	21.676	.001	1.455	.384	.658	2.253

Research question 2: Do audio glosses play any role in enhancing reading comprehension among Iranian EFL learners?

Table 3. Mean gain scores for vocabulary knowledge among samples in audio gloss and control group

	Group	N	Mean	Std. Deviation	Std. Error Mean
Gain score	Audio	15	3.60	.910	.235
	Control	14	.86	1.231	.329

As it can be observed from Table 4, a significant difference was reported between gain score in audio group and control group in Iranian EFL context (t=2.884; P= .007). Based on the results in Table 3, the participants scored higher (M=3.60, SD=.910) when they were exposed to audio glosses during their reading than when they were not exposed to any kind of gloss in the control group (M=.86, SD= 1.231). In other words, audio glosses could play a significant role in learning new vocabulary while reading the text.

Table 4. Independent sample test for gain score in vocabulary knowledge for samples in audio gloss and control group

		t-test for Equality of Means						
		T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Gain total	Equal variances assumed	2.884	29	.007	1.202	.417	.349	2.054

	Equal variances not assumed	2.849	26.267	.008	1.202	.422	.335	2.068

Research question 3: Can textual-pictorial glosses enhance reading comprehension among Iranian EFL learners?

Table 5. Mean gain scores for vocabulary knowledge among samples in textual-pictorial gloss and control group

	Group	N	Mean	Std. Deviation	Std. Error Mean
Gain total	Textual-pictorial	17	2.06	1.088	.264
	Control	14	.86	1.231	.329

As shown in Table 5, the students learned new words better when they were exposed to textual-picture annotation (experimental group) than the time they were not exposed to (Control group) (Mean=2.06 and .86, respectively). As evidenced in Table 6, the "t" value of 2.849 was found to be significant at .001 level. In other words, textual-pictorial glosses could play a significant role on increasing adult EFL learners' vocabulary knowledge.

Table 6. Independent sample test for gain score in vocabulary knowledge for samples in audio gloss and control group

		t-test for Equality of Means						
		t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Gain total	Equal variances assumed	2.884	29	.007	1.202	.417	.349	2.054
	Equal variances not assumed	2.849	26.267	.008	1.202	.422	.335	2.068

Research question 4: Can audio-pictorial glosses enhance reading comprehension among Iranian EFL learners?

Table 7. Mean gain scores for vocabulary knowledge among samples in audio-pictorial gloss and control group

	Group	N	Mean	Std. Deviation	Std. Error Mean
Gain total	Audio-picture	15	2.07	1.163	.300
	Control	14	.86	1.231	.329

Based on the results in Table 7, we can say that the students learned new words better when they were exposed to audio-picture glosses (experimental group) than when they were not exposed to them (Control group) (Mean=2.07 and .86, respectively). Thus, there is a significant difference between gain score in the audio pictorial group when they were exposed to audio-picture glosses during reading and the group who did not receive any kind of gloss (t=-2.715; P= .012) (Table 8). In other words, audio-pictorial glosses could play a significant role in increasing adult EFL learners' vocabulary knowledge.

Table 8. Independent sample test for gain score in vocabulary knowledge for samples in audio-pictorial gloss and control group

		t-test for Equality of Means						
		T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Gain total	Equal variances assumed	2.720	27	.011	1.210	.445	.297	2.122
	Equal variances not assumed	2.715	26.561	.012	1.210	.446	.295	2.124

Research question 5: Is there any significant difference among the effect of textual, audio, textual-pictorial, audio-pictorial glosses on L2 reading comprehension among Iranian EFL learners?

In order to answer the fifth question, the vocabulary gain score of textual, audio, textual-pictorial, audio-pictorial gloss group and control group were computed and then ANOVA was used to see whether there was any significant difference among the four groups in gain score. The results of data analysis (ANOVA) in Table 9 indicate that there is a statistically significant difference between textual, audio, textual-pictorial, audio-pictorial glosses and control group in the results of gain score because the obtained F value of 12.695, was found to be significant at .001 level (P=.000). In other words, the fifth null hypothesis (There is no significant difference among the effect of textual, audio, textual-pictorial, audio-pictorial glosses on L2 reading comprehension among Iranian EFL learners) is rejected.

Table 9. Results of ANOVA for mean posttest scores of samples in textual, audio, textual-pictorial, audio-pictorial gloss and control group

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	55.452	4	13.863	12.695	.000

Within Groups	78.626	72	1.092		
Total	134.078	76			

Now, in order to see where the difference stands, the post-hoc Scheffe test (Table 10) showed that the audio-only group performed significantly better than the textual group (Mean=3.60 vs. Mean=2.31) and the textual group outperformed the other groups. In conclusion, the audio group was the best group in terms of performance based on gain score. As a result, audio-only annotation was recognized to be the most effective method for learning new words during reading comprehension.

Table 10. Post hoc Scheffe Test

Group	N	Subset for alpha = .05		
		1	2	3
Control	14	.86		
Text picture	17		2.06	
Audio picture	15		2.07	
Text	16		2.31	
Audio	15			3.60
Sig.		1.000	.978	1.000

4. Discussion

The results indicated that text-only gloss, audio-only, text-picture, and audio-picture gloss or annotation could help second language learners improve their reading comprehension. Regarding the difference between the effect of four types of gloss, the audio-only group performed significantly better than the textual group and the textual group outperformed the other groups. As a result, audio-only annotation was recognized to be the best method for learning new words during reading comprehension text.

The results of this study could support the modality effect of the cognitive theory of multimedia learning (Mayer, 2001). Text annotation and audio annotation are both verbally-presented information; thus both kinds of annotation contain a combination of verbal and non-verbal information. Based on the modality principle (Baddeley, 1999; Mayer, 2001), text annotation and picture annotation will be processed by the visual channel, while audio annotation will be processed by the auditory channel. Therefore, in text-picture annotations, the simultaneous register of both text and picture caused the visual channel to be overloaded. This led to information processing that was, at least initially, carried out solely in the visual working memory. Thus, the cognitive resources available in the visual working memory had to be divided between textual and pictorial information, whereas the auditory (phonological) working memory was left unused.

In comparison, in audio-picture annotations, the audio was registered by the auditory channel and processed in the phonological working memory, while the picture was registered by the visual channel and processed in the visual working memory. This combination allowed cognitive resources in both working memories to be used. In other words, more cognitive resources were utilized in audio-picture annotations than in text-picture annotations.

The results of the present study confirm those studies which have reported the superiority of a combination of audio and picture in comparison to a combination of text and picture when presenting new knowledge (Mayer & Anderson, 1991; Mayer & Moreno, 1998; Moreno & Mayer, 1999). According to the modality principle, audio-picture annotation simultaneously engages both the visual working memory and auditory working memory, while text-picture annotation involves only the visual working memory; therefore, audio-picture annotation enables more application of available cognitive capacity and should consequently lead to more content recall. The results from this study indicate the superiority of audio-picture annotations over text-picture annotations and the superiority of audio-only over text-only. However, previous studies have reported on the preference of visual learning styles over auditory learning styles among Asian students (e.g. Ye & Wang, 2003). For this study, the visual information presented via audio-picture annotation might act as better retrieval cues, in comparison to the information presented via text-picture annotation, to help the participants when taking the comprehension tests.

5. Final conclusions and implications for the future

In conclusion, the results of the study demonstrate that audio-only and audio-picture annotation are more effective than text-only and text-picture annotation in enhancing reading comprehension. The findings of this study suggest a number of implications and extensions for the classroom. First, the present study was conducted in an English language institute under the normal constraints of classroom teaching.

This study provided the much-needed information on the effect of four types of annotation on second language reading comprehension. By comparing text-only, audio-only, audio-picture and text-picture, it shed light on the use of different dual annotations for L2 learning. The present study has established that audio-only annotation is superior over text-only annotation in facilitating L2 vocabulary learning while reading and the superiority of audio-picture over text-picture annotation in enhancing reading comprehension. This contributes to the extension of the cognitive theory of multimedia learning to second language learning by verifying both the modality effect and split-attention effect.

Although this study has made some contributions to gloss or annotation research in second language acquisition, some questions such as the effects of different annotations, dual annotations on L2 vocabulary learning through reading and incidental and intentional vocabulary learning conditions on L2 reading comprehension as measured by different tasks still remain unanswered.

In addition to the contributions and implications for the field of second language acquisition, especially in the area of multimedia annotation research, this study carried important pedagogical implications. First of all, the study provides some insights for material designers into choosing the right combination of modalities in facilitating L2 vocabulary learning through reading. As confirmed by this study, the use of audio-only and audio-picture combinations facilitate L2 vocabulary immediate recall in a more effective manner than text-only and text-picture annotation. In designing materials, this finding could be taken into consideration when making decisions about presenting information in different modes. This could also inform language teachers and administrators in making decisions about the most effective programs to enhance L2 vocabulary learning and reading comprehension.

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Appendix A

Vocabulary Knowledge Scale (VKS)

Directions: For each word, there are three choices of how much you know about the word, please **circle** the one that fits you most. If you choose III, please written down the meaning of the word.

1. **shepherd**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

2. **placard**

I I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

3. **prairie**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

4. **phantom**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

5**. noose**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

6. **herd**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it

means_____

7. **twig**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

8.**damsel**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

9. **colonist**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

10. **saddle**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

11. **labyrinth**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

12. **cornet**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

13. **armor**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

14. **bayonet**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

15. **beak**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

16. **barrel**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

17. **accordion**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

18**. satchel**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

19. **goblet**

I. I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

_____

20. **mansion**

I .I don't remember having seeing this word before

II I have seen this word before, but I don't know what it means

III I have seen this word before, and I think it means

Appendix B: Reading Text

The European Settlers of Australia

During the early 1800s, European people began to settle in Australia. They lived along the coast. Most of them thought that the inland of Australia was a **prairie**. In fact, a mountain range separates the coast from the inland. The mountain range is called the Great Dividing Range. To the new settlers, it seemed like a **labyrinth** of unexplored valleys and mountains. Burke and Wills successfully crossed the Great Dividing Range in 1830.

After that, European settlers started to settle beyond the mountains. Most of them were **shepherds**. They raised animals for meat. They wore old clothes, ate simple foods, and lived in small houses. Sometimes the native people attacked them. Other times, animals such as emus attacked them with sharp **beaks**. They didn't have **armor** to protect themselves.

Banjo Patterson was one of the most famous early settlers. He was a songwriter. He wrote Australia's most famous song: Waltzing Matilda. The song is about a young traveler. With nothing to do, the young man sat under a tree, put his **satchel** on the ground and played his **accordion**. Then he saw a **herd** of cows and decided to steal one to eat.

At that time, life was hard and people hated stealing. The owner of the cow reported the loss to the police. A local policeman caught the young traveler. The policeman took away the young man's **saddle** and horse, and put him in prison. He used his **cornet** to call for a meeting at the center of the town. After the meeting, the young man was made to stand on a **barrel**. The policeman put a **noose** around the young man's neck and killed him.

Most Australian songs are not that sad, but Waltzing Matilda tells the stories of the early **colonists** in the first part of the 1800s in Australia. By the 1850s, however, life for these early settlers became better. Gold was discovered in the colony of Victoria. As a result, thousands of new settlers came and made Australia their home. Many of them became rich through the gold rush. In many stories of that time, a **damsel** had nothing better to do than to be beautiful. She just drank from a golden **goblet**, looked pretty for handsome young men and lived in a big **mansion**.

More people came to Victoria for gold. The early settlers were afraid of the newcomers.

They organized soldiers to keep order. At times, the newcomers walked on the streets and waved **placards** as a sign of protest. On the placards, they drew pictures of **phantoms**. Sometimes they threw **twigs** at the soldiers. However, the soldiers, each armed with a **bayonet**, easily ended the protests.

Appendix C: Word Recognition Test (WRT)

For each underlined word, please circle the correct meaning from the four choices.

1. Most of these settlers were shepherds.

a. a person who travels in the forest

b. a person who takes care of sheep

c. a person who digs gold for a living

d. a person who buys and sells sheep

2. To the new settlers, it seemed like a labyrinth.

a. a group of scattered houses

b. a set of connecting roads on a map

c. a confusing set of connecting paths

d. a group of animals living together

3. The policeman took away the young man's saddle.

a. a small bag

b. a leather seat

c. a handgun

d. a musical instrument

4. Most of them thought that the inland of Australia was a prairie.

a. a large area of wetland

b. a large area of grassland

c. a large area of desert

d. a large area of forest

5. They didn't have armor to protect themselves.

a. wooden weapons

b. metal tools

c. wooden housing

d. metal clothing

6. The young traveler put his satchel on the ground.

a. a small bag with a shoulder strap

b. a wine glass with a base and a handle

c. a leather seat used to ride horses

d. a long sharp knife used by soldiers

7. In many stories of that time, a damsel does nothing all the time.

a. an unmarried girl

b. a housewife

c. a young soldier

d. a rich man

8. They drew a picture of a phantom on the wall.

a. a horse

b. a ghost

c. a person

d. a sheep

9. The policeman put a noose around the traveler's neck.

a. a long necktie

b. a long metal chain

c. a rope tied in a circle

d. a thin piece of cloth

10. The newcomers threw twigs at the soldiers.

a. a tree branch

b. a wood chip

c. a small stone

d. a smelly plant

11. She drank from a golden goblet.

a. a drinking glass

b. a water bowl

c. a table spoon

d. a metal plate

12. The policeman used his cornet to call for a meeting.

a. a box-shaped musical instrument that you play with hands

b. a whistle used by policemen to get people's attention

c. a musical instrument that you play by blowing into it

d. a big bell used to inform people of the time in the past

13. The traveler saw a herd of cows.

a. a number of people living together

b. a number of animals living together

c. a number of travelers on the desert

d. a number of policemen at the station

14. The colonist arrived in Australia in 1800s.

a. a person who writes songs for travelers

b. a person who takes care of sheep

c. a person who settles in a new country

d. a person who fights for his country

15. The young girl lived in a mansion.

a. a large house

b. an old castle

c. a tall tower

d. a small cottage

16. Each soldier is armed with a bayonet.

a. a handgun used by policemen to protect people

b. a long and sharp blade fixed at the end of a gun

c. a whistle used by policemen to get attention

d. a knife used by soldiers to kill animals

17. A gold digger waved a placard at the soldiers.

a. a flag people wave in public to get attention

b. a sign people hold in public in a demonstration

c. a piece of cloth people use to cover their heads

d. a cotton scarf people wear in cold weather

18. The young man was made to stand on a barrel.

a. a large tree trunk for people to stand on it

b. a wooden bench for people to sit on it

c. a large container with two handles

d. a large container with flat top and bottom

19. Emus attacked the settlers with sharp beaks.

a. the long and sharp knife used by hunters

b. the hard pointed part of a bird's mouth

c. the sharp blade at the end of a gun

d. the pointed horn of a large animal

20. The young traveler played his accordion under the tree.

a. a whistle used to get attention

b. a big bell used to tell people time

c. a box-shaped musical instrument

d. a musical instrument like a trumpet

Appendix D

Multiple-Choice Reading Comprehension Questions

Based on the reading passage, please circle the best answer for each question:

1. When the European settlers arrived in Australia in the 1800s, they had a misunderstanding about the inland of Australia. What is the misunderstanding?

A. They thought the inland of Australia was a large forest.

B. They thought the inland of Australia was a large prairie.

C. They thought the inland of Australia was a large mountain.

D. They thought the inland of Australia was a large lake.

2. Which of the following is mentioned as one of the dangerous things the early settlers had to face?

A. bad weather of the inland

B. thieves who steal cows

C. bayonets of the newcomers

D. animals with sharp beaks

3. The early settlers did NOT have which of the following?

A. old clothes

B. metal armor

C. small houses

D. animal meat

4. The main character in the song “Waltzing Matilda” is a _____.

A. shepherd

B. soldier

C. songwriter

D. traveler

5. According to the passage, the character in the song did NOT have _____.

A. a small bag

B. an accordion

C. a horse and saddle

D. a sharp blade

6. What did the policeman use to call for a meeting at the center of the town?

A. an accordion

B. a cornet

C. a whistle

D. a goblet

7. How did the main character in the song die?

A. He was killed by a stone.

B. He was killed by a gun.

C. He was killed by a noose.

D. He was killed by a bayonet.

8. In many stories about the European settlers after the1850s, a character is often used to describe the life at that time. Who is that character?

A. a young woman

B. a settler's wife

C. a young soldier

D. a young shepherd

9. What did the newcomers do to show their dislike of the soldiers?

A. They moved away from the center of the town.

B. They walked on the streets and waved signs.

C. They threw small stones at the soldiers.

D. They used bayonets to fight the soldiers.

10. What pictures did the newcomers draw on the placards?

A. pictures of prairies

B. pictures of satchels

C. pictures of ghosts

D. pictures of animals

THE IMPACT OF ASYNCHRONOUS COMPUTER-MEDIATED INSTRUCTION (CAI) ON EFL LEARNERS' VOCABULARY UPTAKE ACROSS DIFFERENT PROFICIENCY LEVELS

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Abstract

This study investigated the effect of computer-assisted instruction (CAI) on adult second language (L2) learners' vocabulary recognition and production across high and low proficiency levels. Seventy-four participants were assigned to experimental (CAI) and control groups. All participants in the CAI group were categorized into high and low proficiency levels, based on their L2 vocabulary knowledge. The treatment lasted for one semester, 16 sessions, during which 16 passages were covered. While the CAI group individually worked on the passages uploaded on the CALL software, enhanced with hypertext annotations, the control group read the same passages through traditional teacher-directed instruction. The comparison of vocabulary recognition and production pretest and post-test scores revealed the significant effect of CAI on L2 learners' vocabulary uptake in the immediate and delayed post-tests. While no significant differences were found between the high and low proficiency participants in terms of their improvement from production pretest to the post-test, lower-level participants revealed more vocabulary recognition gains. The findings have pedagogical implications for L2 teachers, practitioners, and courseware designers in that they can rely on CALL software as a viable scaffolding tool for L2 vocabulary growth.

Keywords: asynchronous CALL; computer-assisted instruction (CAI); hypertext annotations; vocabulary uptake

1. Introduction

Almost all second language (L2) learners and teachers are well aware of the fact that learning an L2 involves acquiring a large number of words. Experts and researchers in second and foreign language acquisition have increasingly emphasized the importance of investing in vocabulary learning. According to Gardner (2011), L2 learners' most important goal is to work

for communicating effectively in the target language. Without a good command of L2 lexical knowledge they may face communication breakdown. Indeed, vocabulary acts as a bridge between other language competences which are essential for learners' effective communication (Schmitt, 2010). Nevertheless, L2 language learners have difficulty with vocabulary learning. Only a few learners come close to the threshold level in terms of the breadth and depth of vocabulary knowledge (Qin, 2012), thus, it is important to systematically design the learning and teaching of a large number of new words.

Despite the importance of vocabulary acquisition, it seems that the traditional approaches to vocabulary learning have been ineffective, and teachers and scholars must look for alternative approaches to make vocabulary learning an enjoyable and autonomous practice. In recent years, advances in computer technology and the individuals' easy access to the Internet have opened new paths to instruction in a variety of scientific fields. Accordingly, language learning has been informed by the introduction of new instructional technologies. In the domain of technology-enhanced language learning (TELL), computer-assisted language learning (CALL) and computer-assisted instruction (CAI) have been increasingly applied by language teachers and practitioners to numerous aspects of L2 instruction in synchronous real-time and/or asynchronous delayed-time modes (O'Neil, Fisher, & Newbold, 2004).

Coincidental with the application of CALL technologies in L2 classes, a number of CALL-oriented studies have been conducted by L2 teachers and researchers; nevertheless, the literature in the field on different L2 aspects (e.g., Kılıçkaya, 2015; Li, 2018; Mohamadi, 2018) in general and L2 vocabulary (e.g., Khezerlou, Ellis & Sadeghi, 2017; Tsai, in press; Yun, 2011) in particular is yet inconclusive, and more studies are needed to arrive at a more robust picture of the role technology plays in vocabulary instruction. The need is even more evident in the context of Iran as a developing country with weak online infrastructures, which do not easily allow the implementation of CALL. Moreover, most of the existing studies have addressed a single level of proficiency (e.g., Tsai, in press; Wang, 2014), and few studies (Chen, Chen & Yang, 2019; Gorjian, Moosavinia, Ebrahimi Kavari, Asgari & Hydarei, 2011) have looked at the differential impacts of CALL on participants at more or less proficiency levels.

Given the shortcomings of previous research and the call for more studies on the effects of CALL adoption especially in rarely touched contexts, this study aims to investigate the effect of CALL on the acquisition of L2 academic vocabulary among Iranian university students. Moreover, it explores whether the effect of CALL differs as far as the proficiency

level of the students is concerned. The following research questions were specifically addressed:

1. Is there any significant effect for asynchronous CAI on Iranian L2 learners' vocabulary recognition?
2. Is there any significant effect for asynchronous CAI on Iranian L2 learners' vocabulary production?
3. Does the effect of asynchronous CAI, if any, differ across learners at different proficiency levels?
4. Is the effect of asynchronous CAI, if any, retained over a long time?

2. Literature review

2.1. Background

With the advances made in information technology and the growing use of the Internet, computer technology has permeated educational contexts. Ever since, in the field of EFL, many teachers, educators, and practitioners have adopted CALL-afforded technological platforms as an alternative to or a complement for their conventional instructional approaches. Meanwhile, in vocabulary acquisition, the affordances available in CALL (in terms of numerous contacts with the lexical items and the provision of valuable information regarding vocabulary use, spelling, pronunciation, and collocational patterns in multimedia environments) have received lots of attention.

Adopting technology for learning/teaching purposes is supported theoretically and empirically. Theoretically, Paivio's (1991) dual coding theory and the generative theory of multimedia learning (Mayer, 1997) lend support to the use of multi-modal technological interfaces. These scholars argue that different modes of presentation (verbal, pictorial, and textual) may collaboratively provide more favorable conditions for the acquisition of instructional objectives. While employing different modes simultaneously, the burden placed on the working memory will be reduced, and it can process the information in a less demanding way. Apart from the theoretical support, a wealth of empirical studies (e.g., Chen et al., 2019; Eftekhari & Sotoudehnama, 2018; Li, 2018; Mohamadi, 2018) also offer evidence on the advantages associated with computer technology.

This study does not involve many multimedia modes, since we limited our experimentation to the textual annotation. Accordingly, our study borrows its theoretical foundation from Vygotsky's (1978) sociocultural theory, and in particular the notion of

scaffolding. According to Frawley and Lantolf (1985), the learning process may be regulated by the individual's interaction with others (other-regulation) or with the tools or mediational means (object-regulation). Based on this view, a number of tools act as a buffer between the learner and the social environment and mediate the relationship between the learner and the social world (Lantolf, 2000). From among a variety of tools, computer-mediated platforms can be regarded as scaffolding tools or mediational means for promoting learners' L2 knowledge in general and vocabulary knowledge in particular. Drawing on this theoretical foundation, the purpose of this study was to investigate the effect of asynchronous CAI on Iranian university students' L2 vocabulary uptake.

Two important aspects of vocabulary include the recognition and production of lexical items. According to Harley (2008), "recognizing a word occurs when we uniquely access its representation in the mental lexicon" (p. 207). In production, on the other hand, we go from three phases of conceptualizing the message, formulating it into a linguistic form, and executing it by phonetic planning and articulation. While recognition involves the activation of existing memory traces, production demands searching within the mental representations of the already acquired knowledge (Cariana & Lee, 2001). Given the various underlying processes involved in recognition and production, different factors might affect each of them, amongst them, according to Lee and Pulido (2016), the proficiency level of the individuals. A further purpose of this study was thus to explore whether the effect of asynchronous CAI on L2 vocabulary recognition and production is significantly different for learners at different proficiency levels.

2.2. CALL and vocabulary acquisition

In L2 vocabulary acquisition, computer-mediated annotations or glosses can be employed to clarify the meaning of unknown words. They have the potentiality of assisting learners in an adaptive, autonomous, and individualized context. These annotations might be L1 translations, L2 synonyms, definitions, exemplifications, visuals, or a combination of them. There is ample evidence that the use of hypertext glosses affects the reading skill and vocabulary gains in a variety of ways. According to Abuseileek (2008), the incorporation of CALL *per se* does not explain the overall vocabulary acquisition, but it does so via increasing the retention time and decreasing the vocabulary look-up time. Some other studies (e.g., Su, Li, Liang, & Tsai, in press; Wang, 2016) also attributed the beneficial effects of CALL to learners' positive attitudes, perceptions, and motivation towards reading enhanced by hypertexts.

In pedagogical contexts informed by CALL technology, learners may be engaged in an online synchronous (e.g., video conferencing and chatting) or offline asynchronous (e.g., email and blog) CALL. As stated by Abrams (2003), synchronous and asynchronous CALL are similar and different in a number of ways. Both of them offer affordances in terms of more opportunities for language use, increased amounts of input and output, and more interaction and negotiation. Synchronous mode is simultaneous and requires immediate response and feedback, not allowing for external support. Asynchronous forum, on the other hand, is not subject to time constraints, and learners are able to learn the language at their own pace without being interrupted by the factors inherent in traditional face-to-face modes. Due to the affordance provided in asynchronous mode in terms of reflection on one's ideas, it results in the production of more sophisticated lexicon and syntactically more complex language (Zapata & Sagarra, 2007). According to Fitzpatrick and Donnelly (2010), decisions on whether to adopt a synchronous/asynchronous approach are contingent upon a number of factors including individual dimensions, preferences, aims, purposes, and institutional and pedagogical objectives.

The interface between synchronous/asynchronous CALL and L2 vocabulary acquisition has been examined in a number of studies, providing evidence on the preference of CALL over traditional approaches. In a meta-analysis, Chiu (2013) found an overall average effect of CALL on L2 vocabulary development. She enumerated four important moderators of vocabulary learning in CALL: treatment duration, participants' educational level, game-based learning, and the instruction of the teacher. Learners who received CALL treatment over a short period of time (about a month) benefited from this type of instruction more than those who were exposed to similar instruction in the long run. Moreover, CALL proved more effective for students at high educational levels (e.g., university level) compared with elementary levels. Instruction via CALL without the games appeared to be better than game-based instruction. Finally, autonomous student-centered learning led to better outcomes than teacher-directed instruction. Similar observations in term of the advantages of CALL were also reported by Wang (2016), Mirzaei, Rahimi Domakani and Rahimi (2016), and Tsai (in press).

A number of CALL-focused studies have found that learners' vocabulary retention may vary as a function of their proficiency level, amongst other factors. The corresponding vocabulary growth was found to be dissimilar for low and high proficiency learners. Some studies offered evidence on better vocabulary gains in advanced learners (e.g., Abraham, 2008; Gorgian et al., 2011). Abraham (2008), in synthesizing the findings of previous studies on the impact of glosses on reading comprehension and incidental vocabulary acquisition, found a

small effect size for beginners compared with intermediate and advanced learners. She, however, argued that since the number of studies was limited for each of the instructional levels, these conclusions were tentative. In a further study, Gorjian and his colleagues (2011) found that low achievers benefited from CALL in vocabulary retention (as shown by their immediate post-test scores), but high achievers demonstrated gains in both vocabulary retention and recall (as shown by their delayed post-test scores).

The better gains of the advanced learners were not reported in all studies, with some research documenting better scores of low proficiency learners (e.g., Chen et al., 2019; Li, 2010; Yun, 2011). Li (2010) explored the short-term and long-term effects of using computer-mediated dictionaries on Chinese English as a Second Language (ESL) students' retention of vocabulary items across different proficiency levels. During the treatment, the participants were required to read stories in two conditions: with and without the support of monolingual print dictionaries and/or bilingual electronic dictionaries. This was followed by some vocabulary tests based on the reading texts. The results showed that low-ability learners outperformed their high-level counterparts. Similar findings were reported by Yun (2011), who conducted a meta-analysis to synthesize the findings of some previous studies that compared the effect of computer-mediated glosses on L2 reading and vocabulary retention among learners exposed to these glosses versus those who used traditional techniques. He found the positive impact of computer-mediated glosses on these measures. In particular, it appeared that, in comparison with intermediate and higher-level learners, lower-level learners were more likely to get advantage from multiple multimedia glosses. This concurs with the findings of Chen (2019), who developed a corpus-based paraphrasing system, assisting learners to expand the knowledge of form, meaning, and the use of lexical items and found the better improvement of the weaker students.

Considering the mixed findings in terms of the benefits of CALL to learners at high/low proficiency levels, this domain opts for more studies to arrive at robust findings and generalizable results. Moreover, given the multi-dimensionality of the construct of vocabulary knowledge (Zhong, 2014), vocabulary-focused research should be designed in a way to account for different aspects of word knowledge, including recognition and production. Accordingly, this study aims at examining the effects of asynchronous CALL on Iranian EFL learners' acquisition of vocabulary knowledge across high and low proficiency levels. It also explores whether the vocabulary gains, if any, are maintained over a long time.

3. The present study

3.1. Design

This study adopted a quasi-experimental design with two intact classes to investigate the impact of asynchronous computer-assisted instruction (CAI) on L2 learners' vocabulary uptake across different proficiency levels. The instruction type was the independent variable and learners' comprehension and production of vocabulary represented the dependent variables. The proficiency level of the learners served as a moderating variable.

3.2. Participants

The participants of this study were selected from two intact classes in a national University in East Azarbaijan Province, Iran. They were 79 (45 male and 34 female) freshman students in the age range of 18 to 27 (M = 23.6). The first language of the participants was either Farsi or Azari Turkish, and they had an average of 6.5 years of formal pre-university English learning. Based on their scores in the quick placement test (QPT), the participants were at high-intermediate (N = 37) and low-intermediate (N = 42) proficiency levels. They enrolled in a general English course which is an obligatory course for all university students. There was a 7% subject attrition. Since some students (N = 3) did not take the post-test or were not present in some treatment sessions (N = 2), they were excluded from the final analysis. So, from the original pool of 79 participants, the data from 74 (N = 74) participants including 41 males and 33 females were analyzed.

The classes were assigned to CAI (N = 43; 24 males and 19 females) and control groups (N = 31; 17 males and 14 females). Moreover, based on their scores in the QPT, the participants in the CAI group were assigned to the high (N = 23) and low proficiency (N = 20) levels.

3.3. Instrumentation

Quick placement test (QPT): QPT is a standardized test with established reliability and validity developed by Oxford University Press and University of Cambridge Local Examinations Syndicate. It includes two parts, 60 items, with the second part including more difficult items. For this study, the first part of the test was used. It included 40 multiple-choice items, 25 items for vocabulary and 15 cloze items. The test took about 45 minutes to complete. The internal consistency of the test was also acceptable as indicated by a Cronbach's alpha coefficient of .77.

Vocabulary pre/post-test: Two isomorphic researcher-made versions of a vocabulary test were administered as the pretest and the post-test. The vocabulary items included in each test were meticulously chosen from the students' course book to represent all chapters covered. Each test included 40 multiple-choice and 40 completion items, which were used to assess the participants' recognition and production of L2 vocabulary prior to and following the treatment. In each of the tests, the items were equally distributed in terms of the word classes (parts of speech) including five items for each of the noun, adjective, verb, and adverbs. Moreover, to control the effect of word frequency level, an attempt was made to choose the lexical items in the test stem and response options (in the case of the recognition test) from among the 4,000 and 5,000 word frequency levels. In scoring the recognition test, each correct answer was given 0.05 point. There was no penalty for wrong answers. The criteria used for scoring the production tests were based on the lenient/strict evaluation proposed by Yoshi and Flaitz (2002). Accordingly, partially correct answers were given 0.25 points while the fully correct answers were allocated 0.5 point. Otherwise, no point was assigned to the responses. The maximum score for each of the recognition and production tests was 20.

The original version of the pretest was piloted with 20 students similar to the target population. Following the pilot test and having consulted with two specialists in the field, some items were removed or replaced. The reliabilities of the tests were also measured by Cronbach's alpha coefficient and found to be acceptable yielding .78 and .73 coefficients for the pretest and the post-test, respectively. The subjective judgments of two experts in TEFL were used to check the content validity. Moreover, the inter-rater reliability measures of the production test scores were verified by Spearman-Brown Formula with coefficients of .79 and .83 for the production pretest and post-test, respectively.

Questionnaire: A background questionnaire was administered to elicit the participants' prior knowledge and experience in using computer technology. The 20 items in the questionnaire were adapted from Warner (2004), and in addition to demographic questions (name, age, gender, native language), it included three parts:

(a) questions on the participants' amount of access to the computer/Internet [how many hours a day they used computers at campus, in dorm/home, at work (if they had a job), and other (specify)],

(b) the purposes for which they used the computer (word processing, email, World Wide Web, chat and online discussions, and gaming)

(c) their assessment of the extent to which they used the technology for a variety of purposes (for career, communication with people, learning about people and

cultures, overcoming weaknesses, getting a sense of belonging to a community, and enhancing the creativity).

The participants provided their responses to part (b) and (c) on a 5-point Likert scale. The participants' responses to the questionnaire items were used to assign them to control and experimental groups, with the students with more prior knowledge and further experience of the computer technology being placed into the experimental group. This was done to ensure that the experimental group's computer literacy (as a construct irrelevant variance) or a lack thereof did not affect their post-test performance.

Textbook: To pass the general English course, all students needed to cover eight chapters (16 passages) of *Active Skills for Reading 2* (Anderson, 2008). It remains one of the major sources for General English courses in most of the universities in Iran. The book has been authored with an intermediate-level audience in mind who aim at increasing their general and academic English knowledge and are preparing for standardized tests. It includes a variety of passages with interesting and engaging topics (e.g., young athletes, human body, leisure time, and music). Each unit contains some brainstorming questions followed by two passages. After each passage, there are several activities including reading comprehension exercise, activities designed to promote learners' critical thinking skills, vocabulary matching exercises, and completion type exercises. For this study, the focus was mainly on the activities that aimed at promoting L2 vocabulary knowledge.

Vocabulary building software: The vocabulary building software employed in this study was *Learning with Texts*, version 14. It is a tool to support the general and academic language learning through reading, listening, and testing the words in the context. It has a lot of user-friendly resources; however, not all of these facilities were used in this study. One of the most important and useful features of this software – which is hardly present in similar types of vocabulary software – is its potential for users to upload their content. The main feature of the software used in this study was the glossed dictionary which enabled the learners to look up the words' L1 translation, synonyms, and parts of speech. Also, specific modules have been incorporated into this software to provide the words' pronunciation.

3.4. Procedure

Prior to the treatment and based on the participants' responses to the background questionnaire, the participants with more prior experience with CALL applications were assigned to the experimental (CAI) group while those with lesser experience sat in the control group. Moreover, based on their QPT scores, all participants in the CAI group, in an uninformed way,

were assigned to high and low proficiency levels. In the introductory session, the CAI group was familiarized with the type of instruction and materials used and received technical training on how to use the vocabulary software.

The CAI group received the treatment in the language laboratory equipped with PCs with the vocabulary building software installed, headphones, and a good Internet connection. Before each session, the reading passage that would be covered in that session was uploaded by the teacher (one of the researchers). At the very beginning, the learners listened to the passage through headphones. Following this, they read the passage on their own. While encountering a new word, they clicked on it. A window then opened displaying the information needed to clarify the meaning of that word like synonyms, antonyms, definitions, and sample sentences including the word. Halfway through the task, the teacher walked around and assisted the students if they encountered any problems.

While the CAI group received the treatment in the language laboratory, the control group attended the sessions in a normal classroom with no computing facilities. The participants in the control group covered the same passages individually with no access to the CALL software. Prior to reading each paragraph, the meanings of the unknown words were clarified by the teacher through verbal cues including synonyms, definitions, and examples.

After reading each passage, sample textbook activities with a major focus on vocabulary development were done by both groups. While each participant accomplished the activities individually, the teacher monitored their performance and offered them feedback and assistance. Finally, the answers were checked and shared with the whole class.

The treatment lasted three months, 16 sessions, once a week and twice every other week for 90 minutes. Following the treatment, the post-test and four weeks later, the delayed post-test including the vocabulary recognition and production tests were administered to gauge the participants' recognition, production, and retention of vocabulary items after the treatment.

3.5. Data collection and analysis

The data for this study were collected using three instruments: QPT, questionnaire, and vocabulary pre/post-test. QPT was administered before the treatment to check the participants' general English proficiency level. The questionnaire was completed by the students to assign them to control and experimental groups. Vocabulary pretest and post-test, including a similar number of multiple-choice and completion items for the recognition and production of vocabulary, were administered to gauge the participants' knowledge prior to and following the treatment.

The data collected were analyzed using SPSS version 22. A series of inferential and parametric statistics were run. After ensuring the normal distribution of the data, a series of tests were run to answer the questions. The level of significance was set at 0.05. As for research questions 1 and 2, two independent samples *t*-tests were conducted to compare CAI and control groups' post-test scores in both measures of recognition and production of vocabulary items. Moreover, two paired samples *t*-tests were run to make sure that the CAI group improved from pretest to post-test in recognition and production of vocabulary. As for the third research question, a series of ANOVA tests were run to compare high, low, and control groups in vocabulary recognition and production at pretest and post-test stages. Using the Scheffe test, post-hoc paired comparisons were also run to locate where the difference between the groups lies. To answer research question 4, two paired samples *t*-tests on recognition and production post-test and delayed post-test scores of the CAI group were conducted to check whether the effect of the instruction was durable over time.

The following section presents the results, which are organized around the three main areas of focus in this study: (a) the effect of CAI on vocabulary uptake, (b) the effect of CAI across high and low proficiency levels, and (c) the long-term effect of CAI on vocabulary uptake**.** Finally, the results obtained from the questionnaire were discussed.

4. Results

4.1. The effect of CAI on vocabulary uptake

The first and second research questions addressed the effect of CAI on vocabulary recognition and production. Table 1 shows the descriptive statistics for CAI and control groups in the pretest and the post-test. The comparison of means shows that the CAI group outperformed in vocabulary recognition post-test (M = 13.43; SD = 2.53) compared with the pretest (M = 9.69; SD = 3.24). Similarly, the mean increased from production pretest (M = 10.03; SD = 3.18) to post-test (M = 13.03; SD = 3.01).

Table 1. Descriptive statistics for the pretest and the post-test scores

	N	Mean	SD	Min.	Max.
Control, Recognition Post-test	31	10.27	2.01	8.00	13.00
Control, Production Pretest	31	9.98	1.23	8.50	13.50
CAI, Recognition Pretest	43	9.69	3.24	5.50	14.0
Control, Production Post-test	31	10.23	4.09	7.5	15.00
CAI, Recognition Post-test	43	13.43	2.53	12.0	19.0
CAI, Production Pretest	43	10.03	3.18	7.50	18.0
CAI, Production Post-test	43	13.03	3.01	9.00	16.5
Control, Recognition Pretest	31	9.61	1.22	8.50	14.00

Independent samples *t*-tests were conducted to compare the means of the CAI and control groups in vocabulary recognition and production post-tests (Table 2).

Table 2. Independent samples *t*-test for vocabulary recognition and production post-test scores of CAI and control groups

				Paired Differences 95% Confidence Interval				
	Mean	**SD**	**SEM**	**Lower**	**Upper**	***t***	***df***	**Sig.(two-tailed)**
CAI, Control Rec.	3.16*	0.35	0.29	2.56	5.98	9.74	43	0.00
CAI, Control Pro.	2.90*	0.47	1.3	.020	3.07	10.23	39	0.00

Note. The mean difference is significant at the 0.05 level.
Rec = Recognition, Pro = Production

The results of independent samples *t*-tests, as illustrated in Table 2, show a significant difference between the post-test scores of control and CAI groups in vocabulary recognition ($t = 9.74$, $p < 0.05$) and production ($t = 10.23$, $p < 0.05$). To assess the CAI group's improvement from pretest to post-test (within-group comparison), paired samples *t*-tests were conducted (Table 3).

Table 3. Paired samples t-test of CAI group's scores for the vocabulary recognition and production tests

					Paired Differences 95% Confidence Interval			
	Mean	**SD**	**SEM**	**Lower**	**Upper**	***t***	***df***	**Sig.(two-tailed)**
Rec. pretest-post-test	3.74*	.23	.43	-2.38	3.98	10.26	21	0.00
Pro. pretest-post-test	3.10*	.45	1.2	-3.02	4.64	12.76	21	0.00

Note. Rec = Recognition, Pro = Production

The results of paired samples *t*-tests (Table 3) comparing the effect of CAI on vocabulary uptake show that significant differences exist between the participants' mean scores in recognition ($t = 10.26$; $p < 0.05$) and production post-test ($t = 12.76$; $p < 0.05$) compared with the pretest. Thus, in response to the first and second research questions, it can be concluded that CAI had a statistically significant effect on vocabulary uptake of Iranian L2 learners.

4.2. The effect of CAI across high and low proficiency levels

The focus of the third research question was the effect of CAI on vocabulary uptake across the participants at high and low proficiency levels. Table 4 shows the descriptive statistics related to the pretest and post-test scores of control, high, and low groups. As shown in the table, there are differences in the vocabulary recognition and production mean scores of the high group (Recognition M = 14.32; SD = 3.07; Production M = 13.49; SD = 1.02) and low group (Recognition M = 12.03; SD = 1.09; Production M = 12.58; SD = 2.73).

Table 4. Results of the pretest and post-test scores of control, high, and low groups

	N	M	SD	Min.	Max.
High Group's Recognition Pretest	23	11.24	4.03	10.0	15.00
High Group's Recognition Post-test	23	14.32	3.07	12.0	19.00
High Group's Production Pretest	23	10.63	3.21	7.50	19.00
High Group's Production Post-test	23	13.49	1.02	11.5	16.50
Low Group's Recognition Pretest	20	8.12	2.81	5.00	11.00
Low Group's Recognition Post-test	20	12.03	1.09	9.50	15.00
Low Group's Production Pretest	20	9.54	4.31	7.00	12.50
Low Group's Production Post-test	20	12.58	2.73	9.00	14.50

To compare the significance of differences between the mean scores across the high, low, and control groups, two one-way ANOVA tests of between-subjects effects were run to compare the recognition and production scores of the three groups (Table 5).

Table 5. ANOVA tests comparing the improvement of high, low, and control groups from vocabulary recognition and production pretest to post-test

	Sum of squares	*df*	Mean Squares	*F*	Sig.
Rec. Between Groups	326.74	2	163.37	36.12	0.00
Rec. Within Groups	215.02	47	5.63		
Total	541.76				
Pro. Between Groups	298.20	2	203.25	29.86	0.00
Prod. Within Groups	167.32	47	12.02		
Total	465.52				

Note. Rec = Recognition, Pro = Production

As Table 5 shows, there is a significant difference between the three groups in terms of vocabulary recognition ($F = 36.12$, $p < 0.05$) and production scores ($F = 29.86$, $p < 0.05$).

To determine the location of the difference, post hoc pairwise comparisons were run. Tables 6 and 7 present the results of paired comparisons.

Table 6. Post hoc pairwise comparisons of vocabulary recognition gains

		Mean Difference	SEM	95% Confidence Interval		Sig.
				Lower	Upper	
High Group	**Control**	4.05*	0.21	1.73	4.43	0.01
	Low	2.29*	0.72	0.11	5.01	0.00
Low Group	**Control**	1.76*	0.54	1.24	3.81	0.00
	High	-2.29*	0.72	-5.01	-0.11	0.00
Control Group	**High**	-4.05*	0.21	-4.43	-1.73	0.01
	Low	-1.76*	0.54	-3.81	-1.24	0.00

Note. $P < 0.05$

As shown in Table 6, the vocabulary recognition post-test scores are significantly different in three groups. The high group outperformed control (mean difference = 4.05; SD = 0.21) and low groups (mean difference = 2.29; SD = 0.72). Likewise, a significant difference was found between control and low groups (mean difference = 1.76; SD = 0.54). A further point is that although both of the experimental groups appeared to perform significantly better in vocabulary recognition post-test compared with the pretest, as observable in Table 4, the recognition gains were higher in the case of the low group (pretest-post-test mean difference = 3.91) compared with the high group (pretest-post-test mean difference = 3.08). It can be concluded that asynchronous CAI had an effect on adult L2 learners' vocabulary recognition, and the effect was higher for low proficiency learners.

Table 7. Post hoc pairwise comparisons of vocabulary production gains

		Mean Difference	SEM	95% Confidence Interval		Sig.
				Lower	Upper	
High Group	**Control**	3.26*	0.61	.0.71	5.21	.001
	Low	0.91	0.73	-5.01	3.53	.067
Low Group	**Control**	2.35*	0.46	1.28	3.84	.000
	High	-0.91	0.73	-3.53	5.01	.067
Control Group	**High**	-3.26*	0.61	-5.21	-0.71	.001
	Low	-2.35*	0.46	-3.83	1.28	.000

As presented in Table 7, the high and low groups performed significantly better than the control group on vocabulary production post-test (high and control group's mean difference = 3.26, $p < 0.05$; low and control group's mean difference = 2.35; $p < 0.05$). However, no significant difference was found between the high and low group in the production of L2 vocabulary when exposed to asynchronous CAI (high and low group's mean difference = 0.91, $p > 0.05$). Thus, there was an interaction between the proficiency level and the type of vocabulary tests. In response to the third research question, it can be concluded that while both high and low groups outperformed their pretests in vocabulary recognition and production post-tests, the low group revealed higher recognition gains than the high group.

4.3. The long-term effect of CAI on vocabulary uptake

To address research question 4, which addressed the long-term effect of CAI on vocabulary uptake, the post-test and delayed post-test scores of the CAI group were compared. Table 8 shows the descriptive statistics.

Table 8. Descriptive statistics for the post-test and delayed post-test scores of the CAI group

	N	M	SD	Min.	Max.
Recognition Post-test	43	13.43	2.53	12.0	19.0
Recognition Delayed Post-test	43	13.29	3.21	11.0	17.0
Production Post-test	43	13.03	3.01	9.00	16.5
Production Delayed Post-test	43	12.97	3.45	7.00	18.5

To compare the significance of differences between the post-test and delayed post-test mean scores, two paired samples *t*-tests were run.

Table 9. Paired samples *t*-test for the post-test and delayed post-test scores of the CAI group

	Paired Differences 95% Confidence Interval							
	Mean	**SD**	**SEM**	**Lower**	**Upper**	***t***	***df***	**Sig.(two -tailed)**
Rec. Post-Delayed	0.14	.23	.63	0.07	1.23	1.47	47	.15
Pro. Post-Delayed	0.06	1.45	1.42	-1.08	2.69	9.53	38	.07

Note. Rec = Recognition, Pro = Production

Table 9 shows no significant difference ($p = .15$) between the vocabulary recognition scores in the post-test and the delayed post-test (M = 0.14, SD = 0.23) with t (47) = 1.47, $p > 0.05$. Similarly, vocabulary production scores revealed no significance difference between the

post-test and delayed post-test scores (M = 0.06, SD = 1.45) with t (38) = 9.53, $p > 0.05$. Thus, in response to research question 4, it can be concluded that the effects of CAI on vocabulary uptake were retained over four weeks.

4.4. Questionnaire results

The results of the first part of the questionnaire suggested that while almost all learners had access to computers and the Internet, the place and the amount of time they spent on computers per day were different across participants. The majority of the students reported that they had access to computers at campus (4.2), in dorm (3.6), at home (4.3), and in dorm computer center (2.02). Few of them (1.6%) reported computer access at work, and only 1.21 percent used their friends' computers.

Table 10. Participants' responses to the questionnaire (part 1)

The place where you access the computer	**Hours per day**
At campus computer	4.2
In dorm room	3.6
In dorm computer center	2.02
At the place where you live (if not a dorm)	4.3
At work	1.6
From a friends computer Other (please specify)	0.21
Other (please specify)	0.03

Concerning the second part of the questionnaire (the purposes for which the computer/Internet was used), surfing the World Wide Web received the highest score (79**%**), followed by word processing (53%) and email (48%). Using the technology for online chatting and discussion in groups did not receive as much ratings (21% and 17%, respectively). Eighteen percent of the participants reported that they used the computer for gaming purposes.

Table 11. Participants' responses to the questionnaire (part 2)

	often	**sometimes**	**rarely**	**never**
Word processing	53%	15%	29%	3%
E-mail	48%	21%	24%	7%
World Wide Web	79%	13%	5%	3%
Online chatting and discussion	21%	15%	53%	11%
Gaming	18%	22%	29%	31%

The last part of the questionnaire addressed the participants' ratings of the extent to which they used the computer/Internet for a variety of purposes. Most of them (84%) believed that computers are useful for their future careers. Three-quarters of them (75%) reported that technology assisted them to overcome the weaknesses and obstacles. Seventy-one percent and 64 percent used it for communication with other people and for learning about other people and cultures, respectively. Some students (29%) found computers less threatening than face-to-face communication. About half of the students (52%) felt a sense of belonging to a community while using the technology, and a little more students (60%) perceived technology as a means for fostering creativity.

Table 12. Participants' responses to the questionnaire (part 3)

Please rate each of the following questions	**strongly agree**	**agree**	**no opinion**	**disagree**	**strongly disagree**
Learning how to use computers is important for my career.	79%	5%	3%	6%	7%
I enjoy using computer to communicate with people around the world.	43%	28%	14%	5%	10%
Using the Internet is a good way to learn about different people and cultures.	46%	18%	21%	13%	2%
Computers help people overcome weakness and powerlessness.	57%	18%	13%	5%	7%
I am less afraid to contact people by e-mail than in person.	17%	12%	23%	35%	13%
Using e-mail and the Internet makes me feel part of a community	34%	18%	17%	23%	8%
Working with computer makes me more creative.	48%	12%	25%	43%	12%

5. Discussion

This study aimed to investigate the effect of asynchronous CAI on vocabulary uptake among adult L2 learners and to explore whether the vocabulary gains differed across learners at high and low proficiency levels. It was found that CAI had a positive effect on vocabulary recognition and production among adult L2 learners; however, an interaction was found between the proficiency level and the type of vocabulary tests. The differences in pretest and post-test means reveal that while both high and low proficiency groups showed almost similar degrees of production gains, low proficiency participants revealed higher recognition gains. Finally, the effect of CAI was found to be durable over four weeks.

The outperformance of the experimental group compared with the control group documents the beneficial effect of CAI on L2 vocabulary development, which has been corroborated in some studies (e.g., Su et al., 2019; Tsai, in press; Wang, 2014). These studies argued that online vocabulary tools provide opportunities for vocabulary practice and enrichment, an affordance non-existent in traditional approaches to vocabulary instruction. Boers, Warren, Grimshaw, and Slyanova-Chanturia (2017) argued that using different forms of glosses afforded by online tools brings about learners' mental engagement with the target word and hence promotes the acquisition of different aspects of the word. This finding is also consistent with the SCT in that the technological tools provide affordances for learning and regulate the learning process, providing mediated assistance to learners and help them move from object-regulation towards autonomous functioning or self-regulation.

The higher recognition gains observed in the lower level participants concur with the findings of some studies (e.g., Chen, et al., 2019; Li, 2010; Yun, 2011) which claimed that the online vocabulary enhancement tools including the computer-mediated dictionaries and particularly bilingual dictionaries conform to low-ability learners' learning styles and preferences. Zapata and Sagarra (2007) argued that while processing the unknown words, low-ability learners experience greater difficulty and high cognitive load and are likely to avoid allocating much time and mental operations to process these words. The provision of computer-mediated aids helps "enhancing cognitive resources and lead[s] learners to engage in deeper processing when needed" (p. 168).

The improvement of the weak learners, however, contradicts the results of some studies (e.g., Abraham, 2008; Gorjian et al., 2011) that reported higher performance gains by advanced learners and attributed this to the dual code theory (Paivio, 1991). According to this theory, two mental systems or codes, including verbal and non-verbal, account for the knowledge of language and knowledge of the world. When applied to L2 vocabulary acquisition, by using

multiple (auditory and visual) glosses of retrieving new vocabulary, knowledge of the lexical item is established as a result of the simultaneous engagement of auditory and visual memories. However, not a variety of hypertext glosses were used in this study, with the major gloss being the textual one. Although the pronunciation module has been incorporated in the program as well, it assisted the participants' mastery of phonological form rather than meaning and did not contribute to learners' test performances.

Vocabulary recognition gains differed across varied proficiency levels, however, a similar trend was not observable for production gains. While both high and low groups outperformed their vocabulary production pretest scores, not a significant difference was found between the two groups in their vocabulary production gains. Moreover, as revealed by their delayed post-test scores, both groups were found to retain the vocabulary gains after four weeks. It can be concluded that both groups not only used the textual glosses to make sense of the general meaning of the text, but also retained the lexical associations and cues for future use. This corroborates the findings of some previous studies (e.g., Li, 2010; Rimrott, 2010) that documented the long-lasting effect of CALL on vocabulary acquisition.

6. Conclusion, limitations and suggestions for future studies

The limitations of this study should be acknowledged. As a novel experience, exposure to CAI in the beginning sessions entailed some degree of resistance on the part of the students with a lesser degree of ambiguity tolerance. This was, however, alleviated gradually, and despite an awkward commencement, the students were comfortable with the technology in the later sessions. A further limitation relates to employing a small population and a single type of gloss, i.e., textual. Future research may address the implementation of CALL with a bigger sample size, a variety of annotation types, using more rigid measures, and over a prolonged period of time to provide a detailed account of how the incorporation of CALL technology alone or as an extracurricular program affects the development of different aspects of L2 in general and L2 vocabulary skill in particular.

This study contributes to CALL research by providing evidence on the affordances offered by CAI in vocabulary recognition and production among L2 learners at high and low proficiency levels in both the short- and the long run. Some pedagogical implications may be drawn. Teachers, L2 practitioners, and material designers are suggested to incorporate the technology in the design of the curricula as an aiding tool in conventional face-to-face instructional contexts. The overall better improvement of the low-level group suggests that CAI may be potentially more effective for weaker students, provided that the affordances of this

technology are appropriately tailored to the proficiency level of the students (Çakmak & ErÇetin, 2018). Various features of the CAI interface may be customized to cater for the needs of a variety of students with different educational goals and objectives.

While implementing CAI, it should be noted that technology does not necessarily guarantee success. The educational system's online infrastructures, the stakeholders' computer literacy, the properties of the program, and learners' attributes including their learning styles and preferences (verbalizer or visualizer) are the factors in need of consideration in adopting/adapting the CAI. Moreover, it should be born in mind that, as suggested by Kowie and Sakui (2013), employing computer technology in language learning should not be a replacement for the whole learning/teaching practices and processes, but rather it can be a complement facilitating these practices.

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PLICKERS AND THE PEDAGOGICAL PRACTICALITY OF FAST FORMATIVE ASSESSMENT

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Abstract

Student Response Systems (SRS) can provide effective, immediate, and efficient feedback to students, particularly when undertaking formative assessment. Coupled with active learning approaches, the use of such systems can be beneficial for English language learners by providing opportunities for increased engagement with content and reflection on their knowledge gaps. These opportunities can then potentially lead to increased learner participation, motivation, and linguistic skill development. As an SRS system, the pedagogical practicality of using and developing content with the *Plickers* application is reviewed, with features of the application presented in detail. Methods of applying the application, determining how it aligns with technological frameworks, and presenting the potential of the application for use in the language teaching context are also presented. Ultimately as a tool that can be used to engage students of all ages in formative assessment, it is unique in that it can do this by taking technology out of learner hands while simultaneously assessing all students at once.

Keywords: mobile-assisted language learning; formative assessment; *Plickers*

Application Details

Publisher: *Plickers*

Product type: Web and Android/iOS applications

Language(s): English (website/app), Variable (question text)

Level: Any

Media Format: Image/text

Operating systems: Any smartphone that can run the app, active connection to the Internet if using the website in conjunction with the app (not required)

Hardware requirements: Smartphone (iOS/Android), Internet connection (if using the website)

Supplementary requirements: paper-based QR codes for each student (free to print, laminated cards available for purchase)

Price: Free (app/website), paid/free (laminated/downloadable QR cards)

1. Introduction

When teaching English as a foreign or second language (EFL/ESL), one of the biggest challenges for instructors is that of motivating and engaging learners (Niederhauser, 1993; Lee & Oh, 2014). So too, in recent years, large 'conversation' classes of 40-60 students are becoming the norm (Chetchumlong, 2010), coupled with often limited access to in-class technology, and learners that have a fear of being wrong or are too shy to respond to questions asked of them (Mula & Kavanagh, 2009; Wong, 2016), all leading to difficulties for students in terms of being able to attain adequate language practice, and in receiving prompt feedback from instructors. This is often coupled with environments where practitioners are inhibited by administrative procedures or classroom contexts that hamper the effectiveness of their instruction, and again, all leading to less time for student-teacher interaction and the provision of timely and adequate feedback. As such, administrators, educators, and researchers need to look for ways around these issues – a new and unique way being the innovative implementation of student response systems (SRS) such as *Plickers* (www.plickers.com).

SRSs have long been available to educators and used in ways that fundamentally enhance engagement with learning content by supporting the instructional process (Espey & Brindle, 2010) by providing efficient, effective, and immediate feedback to assist in guiding students with their learning (Crossgrove & Curran 2008). However, as Kim, Al-Mubaid, Yue, and Rizk (2011) note, it is the use of active learning approaches (e.g., group work, discussion, and collaboration) that leads to learning gains when employing an SRS. Active learning principles, sustained by the use of Communicative Language Teaching (CLT) and constructivist methods, have long been at the center of TESOL classes (Monk, 2014). One way of using this method and approach when implementing an SRS sees that students need to work with each other to identify relationships between new information while using prior knowledge to help them reach a conclusion, and that in turn leads to increased comprehension skills, opinion sharing, participation and student-teacher interaction (Lee & Oh, 2014; Yoon, 2017). Espey and Brindle (2010) also note that when learners use an SRS, they can reflect upon peer mistakes and retain more of what they study. Other research supporting SRS use in the classroom shows that it can lead to increased student satisfaction (Hung, 2017), participation (Cordoso, 2011), motivation (Yu & Yu, 2016), vocabulary development (Yu, 2014), and communicative competence (Agbatogun, 2014). Further, research employing the *Plickers* SRS specifically (Kent, 2019) illustrates that it can stimulate active learning, highlight student knowledge gaps, focus learner attention, and encourage engagement with content through formative assessment. Indeed, the most significant implementation of an SRS in the educational context is for

formative assessment (Espey & Brindle, 2010). This kind of assessment in the EFL classroom is something that can help engage students with the learning process and assist them in developing mastery of skills (Premkumar, 2016), and this is something that teachers can use the *Plickers* application to provide (Kilickaya, 2017; Krause, O'Neil & Dauenhauer, 2017).

The purpose of this review, then, is to highlight the means of developing pedagogical content with the *Plickers* application, explaining how to use it with students for formative assessment purposes, and to illustrate the features of the application in detail. In this way, the potential of the application for use in the English as a foreign/second language teaching context is presented, along with the method for how it can be used to engage students in the learning process. The paper also goes beyond other reviews, such as Kilickaya (2017) and Krause, O'Neil, and Dauenhauer (2017), by considering how the application aligns with the substitution, augmentation, modification, redefinition (SAMR) model (Puentedura, 2009) while illustrating how the tool can be applied to provide instantaneous formative assessment while taking technology out of student hands.

2. Description

Paper clickers, or *Plickers*, is a free student response system (SRS) that uses quick response (QR) codes printed on paper for use as a paper clicker (see Figure 1). In this case, each side of the QR code corresponds to one of four options depending on how the card is oriented (A, B, C, or D), with each card assigned a unique number (1-63) for each student. These cards are available for purchase (laminated in packs of 40), or are freely available to print from the website in various sizes and quantities, with the larger cards easy for young learners to handle.

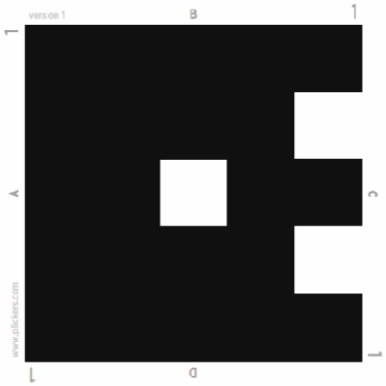

Figure 1. Sample *Plickers* card

To date, QR codes have been used in EFL settings to great effect (Kent & Jones, 2012a), improving motivation, and allowing for the integration of various technologies into the classroom alongside the practice of language content (Kent & Jones, 2012b). An advantage to this app is that, in a minimum-use setting, an instructor-held smartphone or tablet and a paper-based handout per student are all that are required for the SRS to be effective. Responses can also be displayed in real time, using the *Plickers* LiveView option from the website, and if Wi-Fi and a computer with beam projector are available, feedback and discussion on each item can then be conducted easily on-the-fly.

2.1. Pre-class

2.1.1. App and website preparation

Prior to using the *Plickers* app with students, the teacher needs to install the application on their smartphone/tablet (iOS/Android), and then, using the *Plickers* website or application (after registering), create a class (see Figure 2) and assign students to virtual cards (matching the physical ones that they will later use in class; see Figure 3). Classes of up to 63 students can be handled, with student details typed in or entered by cutting and pasting a class roster. Cards are assigned based on student order, so the first student on the roll sheet will need to use *Plickers* card one. Classes can be edited, archived, or deleted from the main page as necessary, but at this time, there is no way to add classes or students from within the app. However, the website and app both provide access to the question library and classes, with the app providing a question history with the website providing reports, access to LiveView (discussed later), cards to print for free, and a comprehensive help section.

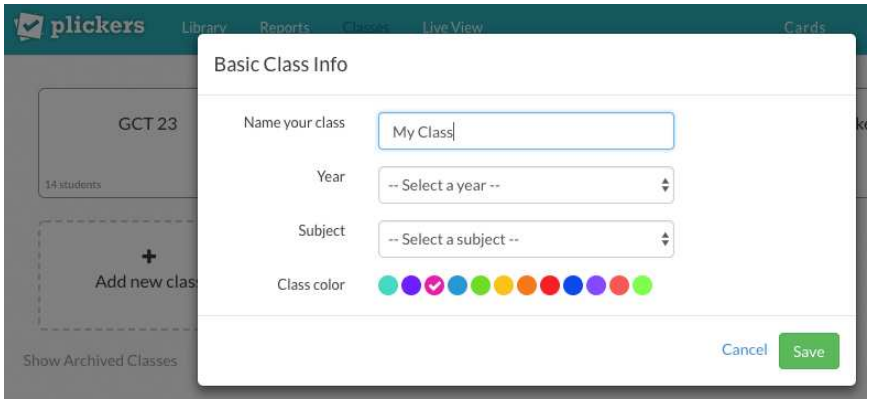

Figure 2. Adding a class on the website

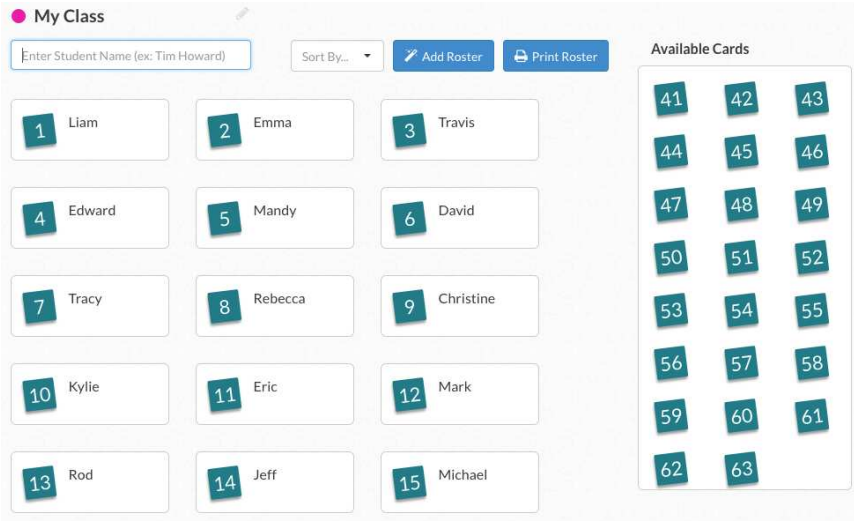

Figure 3. Assigning students to cards

2.1.2. Question design

After classes are created and students assigned to cards, it is time to add questions, and this is done by clicking on ‘Library’ and ‘New Question’ (see Figure 4).

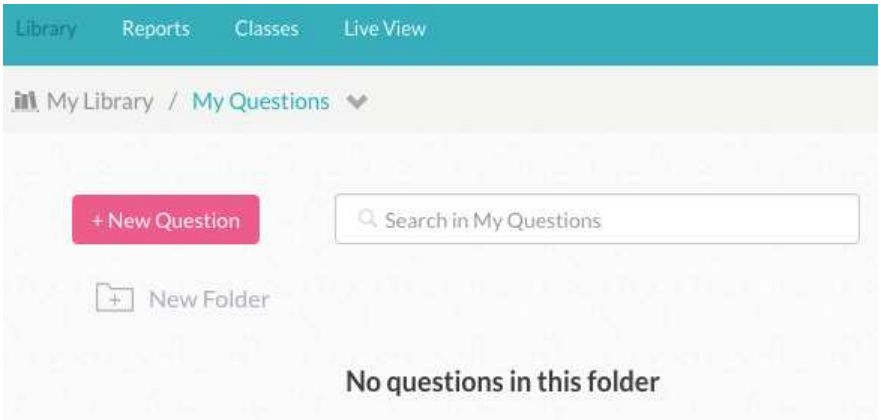

Figure 4. Adding a question

Text, images, or a combination of both, can be added to the question text, and any language can be used for this purpose. Answers can be multiple-choice or true/false (yes/no) with a correct answer set, or left unselected if conducting a survey or poll (see Figure 5a). Up to four answer options can be provided. Questions can also be created from within the app by selecting the class that the question will be used with, and populating the fields in the same manner as the website (see Figure 5b). The application can also utilize the smartphone/tablet camera and

photo library to insert images into questions directly. After being entered, questions can then be edited, moved, un/archived or deleted. Question reports are available from here, as well as the ability to assign the question to a class using 'Add to Queue' (see Figure 5c). Once questions are assigned to a class or a list, they are ready to be used in the classroom in conjunction with the teacher-held smartphone/tablet (with app installed) and the student-held cards. The order of the questions can also be rearranged at this time, either from website or app, or chosen at random during in-class time.

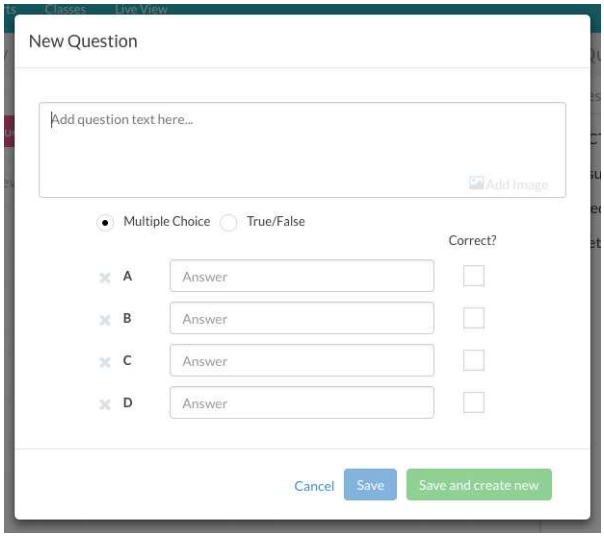

Figure 5a. Entering questions (website)

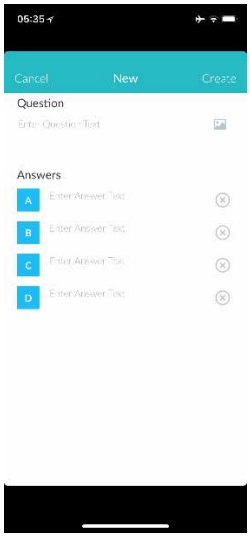

Figure 5b. Entering questions (iPhone app)

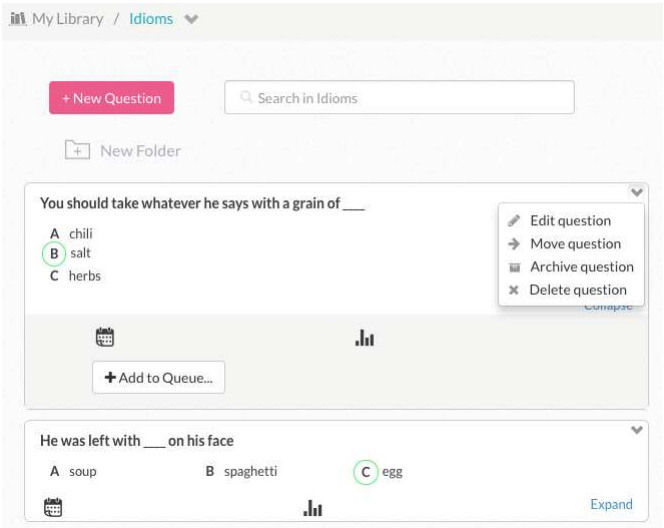

Figure 5c. Example question list (website)

2.2. In-class

2.2.1. Scanning and recording responses

During class, the app alone can be used with paper-based handouts or questions from a textbook, with the app collecting student responses and showing details to the teacher, or it can be used in conjunction with LiveView from the *Plickers* website. If using LiveView, questions are displayed on a screen for all students to see (as in Figure 6a), with the question displayed on the smartphone/tablet as in Figure 6b. When the teacher is ready to scan student responses, the 'Scan Now' button is pressed and with the smartphone/tablet held vertically, a sweeping motion across the room is used for the camera to record responses.

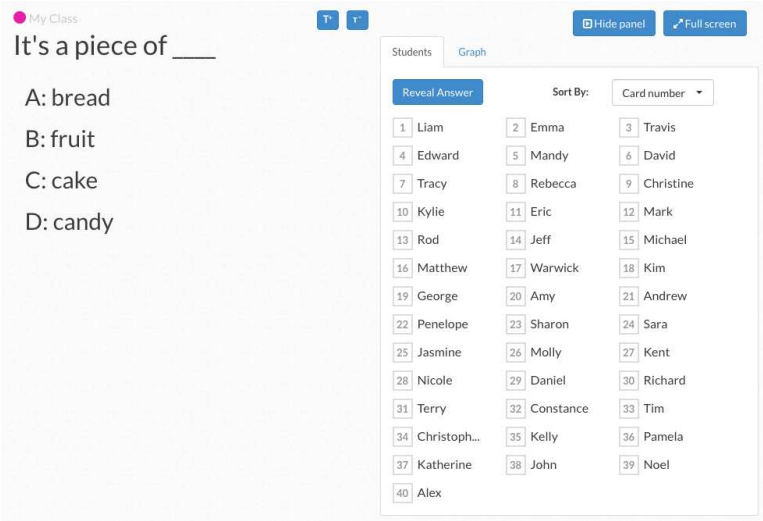

Figure 6a. Question display (LiveView)

Figure 6b. Question display (app)

After scanning the room, student answers are displayed in real time on the smartphone/tablet display (see Figure 7a). Information presented includes number of correct (green) and incorrect (red) responses, total cards scanned, and showing those not scanned (gray). Individual question responses can also be cleared at this stage if responses need to be rescanned for any reason, or saved before proceeding to the next question.

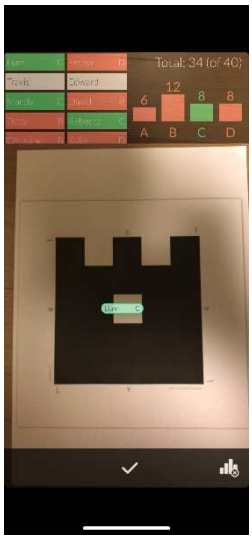

Figure 7a. Scanned question view (app)

Once a card has been scanned, the LiveView card number changes to a tick, assisting both teacher and students in knowing if all cards have been scanned (see Figure 7b). The 'Reveal Answers' option is available to disclose hidden responses (with incorrect options displayed in red, correct in green) if desired.

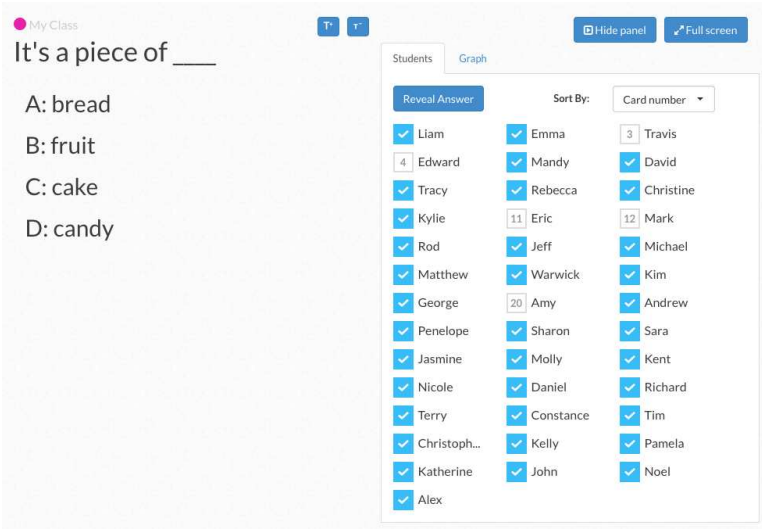

Figure 7b. Cards scanned, hidden responses, question view (LiveView)

There is also an option to show student responses anonymously as a graph initially, and then with the correct responses (see Figures 7c). A similar screen is also displayed on the smartphone/tablet (see Figure 7d).

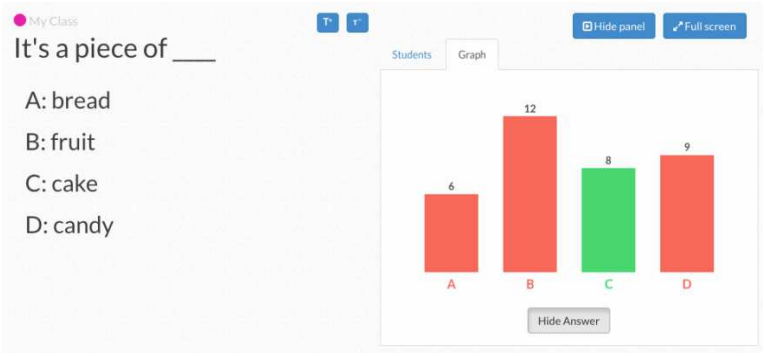

Figure 7c. Answer response graph with correct answer (LiveView)

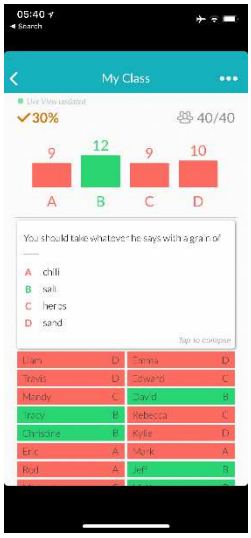

Figure 7d. Post-scan graph (app)

Depending on how the questions are being used, a discussion can then occur revolving around response choices and the merits of each, or the next question can be displayed and answers scanned in the same manner as described above until all questions set for the task have been completed.

2.3. Post-class

2.3.1. Accessing student response data

All student response data are available from the website through the reports section and can be filtered by class and by date, with access to data for individual questions (see Figure 8a) indicating correct and incorrect answers, individual student responses, and the percentage of the class responding correctly. Also available is a scoresheet for an entire class that shows, for any given date range, the total number of questions that the class has responded to, individual student responses to each question, the overall percentage of correct responses per question and in total, and a running percent total for each student regarding all questions that they have responded to (see Figure 8b). Individual questions can also be excluded from the totals if necessary by unchecking the box above each, or examined in detail by clicking the title to open a panel to the right of the scoresheet which also links to individual question data from the report section. These data can be printed, or exported for grading or offline archiving purposes.

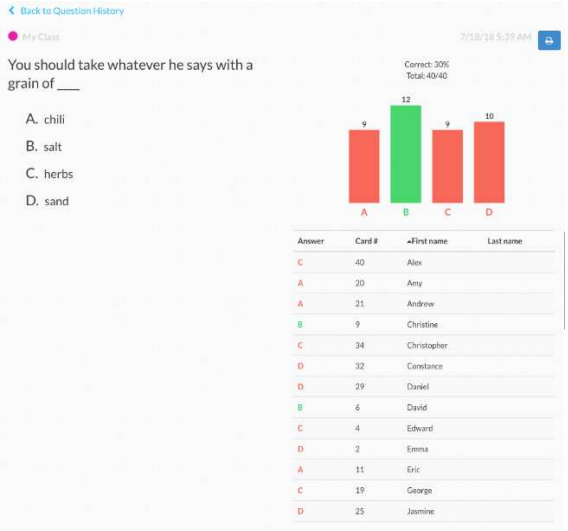

Figure 8a. Report data for individual questions

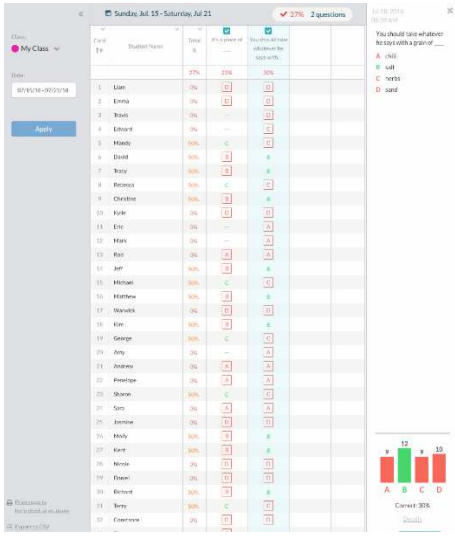

Figure 8b. Scoresheet for a class

3. Evaluation

Ultimately, using *Plickers* to deliver and inform upon the teaching and learning process using formative (low-stakes) assessment is the strength of the application (Kilickaya, 2017), with this kind of assessment referring to a wide variety of in-process checks of student comprehension, learning needs, and academic progress throughout lessons, plus units of study and courses (Dodge, 2009).

Plickers also excels at allowing teachers to engage even the shiest students in classroom activities, allowing those reluctant to respond in normal classroom discussions to contribute anonymously (if desired) while engaging with content, classmates, and the instructor interactively. The application also provides teachers with a means to allow learners to undertake assessment in a way that is less intimidating and anxiety-promoting than those provided in a summative, traditional, or a paper-and-pencil-based manner. In this regard, it is an app that addresses one of the most critical needs of teachers: rapid identification of learner progress. Instant checks for understanding, in turn, identify those students who require additional support or may be experiencing challenges, allowing teachers to decide which students to then assign to others during pair/group work by tying stronger learners to weaker ones.

Flexibility for teachers to craft their own question content for delivery, although limited to four-option choices, provides for the import of questions and graphics from student-assigned content, as well as allowing teachers to craft tailored questions that can encourage analysis, inquiry and target language practice. This may initially be time-consuming, as questions are

entered one at a time, but questions are reusable and adaptable. This potentially allows for a variety of uses across a range of classes, including developing polls on hobbies or favorite things for use with low-level conversation classes; pop-quizzes for review or as a summary for all levels that might also offer practice for sentence structure and vocabulary; and presenting content-based questions for English for specific purpose classes that check on both the understanding of big concepts and the mastery of skills.

The customization inherent in the *Plickers* app allows any use of it to align with the TPACK framework on an individual level. This is where the use of digital tools in the classroom (technical knowledge) crosses over with the method and practice of teaching (pedagogical knowledge) to present and ensure learning from material being taught (content knowledge), with the relationship between these three areas producing different classroom dynamics to traditional instruction, and from which effective teaching with technology can emerge (Koehler & Mishra, 2009), particularly when considering the SAMR model of classroom technology integration (Puentedura, 2009), to which *Plickers* aligns very well:

Substitution – *Plickers* replaces paper-and-pencil formative assessment tasks, and is more interactive and engaging than having students raise hands or indicate a thumbs-up/down to provide responses, offering anonymity in the process.

Augmentation – both teacher and student are immediately aware of recorded responses and, if desired, whether that response is correct or incorrect.

Modification – Teachers and students are able to visualize answers in real time, and react accordingly. Teachers can then holistically discuss responses by sharing responses anonymously, and without revealing the correct answer, allow students to rethink and revise responses.

Redefinition – All students can participate simultaneously, as opposed to calling on students to provide answers individually which at times may see some learners unable to participate at all. Teachers can also use the app to ask questions anytime during a lesson, recording answers that can instantly inform on the direction of instruction.

As the app relies on laminated or printed cards that are scanned by a single smartphone/tablet, this can be less intimidating for technology-challenged teachers or those new to teaching with technology, and this allows teachers to focus more on teaching than on setting up. Also, the use of a single device in conjunction with the app, combined with verbal or paper-delivered questions, is all that is required if technology is lacking in the classroom, and this is just as easily performed as using the app alongside the *Plickers* LiveView website if technology is available. The smartphone/tablet can also save student-response data for teachers

to analyze later from the device itself, or from the website once an Internet connection is established. As such, there is no reliance on individual learners to possess or be provided with equipment that might be forgotten, dead, or which the student does not know how to operate, all of which can lead to lesson and classroom disruption, particularly if there is a need to deliver 40-63 individual clickers to students or for using the same number of smartphone/tablets in the classroom. Of course, as with any technology use, contingency plans are a must in case the teacher's device fails.

The laminated cards that can be purchased from sites like Amazon allow for plentiful reuse, but if lost, can be freely printed. They also make it easy for all levels and ages of students to grasp the concept of providing answers, as cards are simply rotated to the appropriate orientation, and if teachers/students wish, responses can be hidden from peers. Cards are also compact and light enough for teachers to carry in their everyday toolkit, with questions and polls easily created on the fly if required. One issue here, though, is that teachers need to ensure that each student gets the correct card, and using roll sheet order might be the best way to assign cards, particularly since, in terms of privacy, no student information is actually required by the app or website. Teachers may also need to practice scanning techniques with challenges stemming from students shaking their cards, holding them at low angles, getting glare from lights, or if a student is blocking another in a cramped classroom. Further, students also need to be sure that they are holding their cards with their chosen response at the top in order to avoid erroneous scans.

Although designed to be used with one card per student, this can be adapted with a card assigned to pairs or groups to encourage discussion amongst students or teamwork activities, with responses scanned once members have talked through a response. This would allow for the development and inclusion of collaborative learning activities where students work in groups or pairs to develop and demonstrate understanding of content and concepts (Warschauer, 2011), from which instruction can be modified in real time through question choices as the activity is conducted. The report data that is collected after scanning also easily allows teachers to go back and identify where a learner has performed poorly, indicating overall knowledge gaps, as well as being able to identify on a whole-class level where learners lack knowledge. Here, *Plickers* use solves the difficulty associated with a teacher trying to perform such a task by simply monitoring students as they complete in-class tasks, or when going around the room interacting with individuals, pairs, or groups on a more personal level as they practice their language skills.

4. Recommendation

A major benefit of *Plickers* is that it sees minimal to no expenditure from the instructor or institution (Taylor, 2016). As an SRS, it is unique in that there is no special equipment to use or maintain, nor do students need to comprehend or use new technical systems or download any apps (Lam, Wong, Mohan, Xu & Lam, 2011). In contexts where class hours are limited, this facilitates fast and easy setup, allows for ease of employability with small to large classes (either housed in big lecture halls or crammed into closet-sized classrooms), and it can do so in a way where the focus remains on class content. It also provides increased instructor autonomy over technology and the learner content being delivered, and wrestles technology away from the student.

Overall, the app is pedagogically adaptable to a range of formative assessment types, classroom polls, and review tasks, while also proving to be worthwhile as an exit ticket for lessons. As an app effortlessly added to the arsenal of every 21st century language teacher, it can help students easily and quickly understand what they caught from what was taught, while simultaneously providing instructors with snapshots of learner understanding from which they can identify student needs and knowledge gaps that can then be actioned upon in real time or during follow up lessons.

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VOLUME 19, ISSUE 3

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