Game-Based Student Response Systems: The Impact of *Kahoot* in a Chilean Vocational Higher Education EFL Classroom

Claudio Cárdenas-Moncada (claudio.cardenas@cftla.cl)
English Department, Centro de Formación Técnica Lota-Arauco, Lota, Chile
Mauricio Véliz-Campos (mauricio.veliz@unab.cl)
Faculty of Education and Social Sciences, Universidad Andrés Bello, Santiago, Chile
Leonardo Véliz (leonardo.v@deakin.edu.au)
Faculty of Arts and Education, Deakin University, Burwood, Australia

Abstract

Notwithstanding the widespread use of technology in everyday life, there is scant empirical evidence of its impact on students' academic learning, particularly in EFL settings. This study sought to determine the impact of a digital game-based student response system called *Kahoot* on students' English language learning at a Chilean vocational higher-education EFL classroom. To this end, a pretest-posttest quasi-experimental study was set up. A survey was also administered to explore students' perceptions of and attitudes towards the use of *Kahoot* in the EFL classroom. The results of the quasi-experiment showed a statistically significant difference in scores of a low-stakes test for students who used *Kahoot* versus students who did not. Additionally, the results from the survey indicated that students' perceptions of and attitudes towards the use of *Kahoot* were found to be highly positive, which contributed to creating a better classroom environment and fostered a better academic performance

Keywords: Educational technology, Digital Game-based Learning (DGBL), Game-based Student Response Systems (GSRSs), *Kahoot*, EFL

Introduction

Technology in the form of mobile devices such as smartphones, tablets, and laptops are part of our everyday life. However, despite the increased use of technology in virtually all aspects of our lives, its effective use in education, particularly at the classroom level, remains rather unexplored (McCoy, 2016). Although most students have a smartphone and use it regularly, such devices are not allowed in the vast majority of mainstream classrooms as they are often thought to be a distracting element in classrooms (ibid), incapable of facilitating learning (Herrera, Cruz & Sandoval, 2014). However, efforts continue to be made in education to effectively embrace the use of technology inside the classroom. Indeed, the use of Information and Communication Technologies (ICTs) in the Chilean education system has considerably increased over the last decade (Jaramillo & Chávez, 2015).

In the realm of TESOL, despite their increased use by both educators and researchers (Mork, 2014; Alyaz & Genc, 2016), digital game-based learning (DGBL) tools and student response systems (SRSs) remain fairly unexplored, particularly in terms of their effectiveness in L2 learning. *Kahoot*, which constitutes the focus of this investigation, is a free digital game-based student response system (GSRS for short henceforth) that allows students to answer to customized multiple-choice items (Kilickaya, 2016). This tool can be used on a mobile device and the Internet and incorporates game show features such as background music, limited time to provide answers, a point awarding system, and a leaderboard. Scant research has been

conducted on its possible effectiveness on English as foreign language learners. Thus, through the use of a quasi-experimental design, this study sought to determine the impact of *Kahoot* on students' English learning at a Chilean vocational higher-education EFL classroom in Lota, Chile. To this end, a pretest-posttest quasi-experimental study with two intact classes – a control group and a treatment group – was designed. The impact of *Kahoot* on students' learning was measured by means of a post-test with a view to determining whether or not there had been a significant difference in learning gains, operationalised in the form of test scores, between the experimental and control groups. Accordingly, this research study sought to answer the following research questions:

To what extent does the use of *Kahoot* have an impact on Chilean vocational higher education students' English language learning process?

What are Chilean vocational higher education students' perceptions of and attitudes towards the use of *Kahoot* as a teaching tool for English language learning?

Literature Review

MALL and digital game-based learning

The use of ICTs for English language learning purposes has been largely studied under the umbrella term of Computer-Assisted Language Learning (CALL) (Son, 2018), which comprises Mobile-Assisted Language Learning (MALL), defined as the use of mobile devices such as smartphones and tablets to enhance language learning. According to Son, MALL "have recently generated great interest with a wealth of applications and resources available to language learners and teachers." (p. 1), largely due to its ubiquitous character, the learners' perceived freedom to use such technologies (Tai, 2012), and its didactic potential to engage in group tasks (Oz, 2015).

Although mobile technological devices have been at times vilified on several grounds dealing, for instance, with their alleged distractor effect (McCoy, 2016), smartphones, tablets, and laptops are among the most widely used by students and teachers for communicating and accessing multimedia resources such as e-books, databases, web pages, or PowerPoint presentations (Cheung & Hew, 2009). However, the actual use of mobile technology in instructed learning environments leaves much to be desired as "few instructors (30%) create assignments that incorporate mobile technology, suggesting there is not a widespread strategy for leveraging personal mobile technology in the classroom." (Dahlstrom & Bichsel, 2014, p. 19). It has also been suggested that "there is, or at least appears to, a direct relationship between a teacher's competence as a digital citizen and his or her professional behavior with ICT in the classroom" (Area-Moreira et al., 2016, p. 86). Cardenas-Claros and Oyanedel (2016) claim that despite teachers' awareness of the importance and effectiveness of the implementation of ICTs in their classes, "they seem unable to exploit them beyond the role of a repository, a provider of authentic input and, in fewer instances, as a tool to increase meaningful interaction" (p. 221).

The benefits of using MALL in English language learning contexts, reported in a number of studies have focused, for the most part, on the affective responses to the use of technological devices or on students'/instructors' views on the perceived efficacy of technology (Golonka et al., 2012), rather than on empirically supported results (Golonka et al., 2014), as "carefully controlled studies of language learning, in contextually rich and naturalistic environments, are not easy to design or to analyse." (ibid., p. 92). This study,

however, intends to bridge such a gap by examining the extent to which a digital game used in mobile devices can aid English language learning.

As we all know, digital games are undoubtedly very popular and have become a routine activity and are no longer teenagers' exclusive domain (Chik, 2012; Alyaz & Genc, 2016). The motivation, entertainment, engagement, and enjoyment of games can be integrated into curricular content to develop what Prensky (2003) terms "Digital Game-based Learning" (DGBL). The benefits of game-based learning have been reported in the last 20 years. Indeed, according to Jackson et al. (2012), entertainment, one of the main features of digital games, supports learning "by stimulating engagement or by rewarding performance" (p. 116). Serious games, unlike more typical educational settings, require that the learner be involved in order to progress because an uninvolved learner risks losing the game. However, the mere presence of games cannot guarantee engagement. Jackson et al. (ibid) claim that "for the game to be effective, the learner must want to play the game. Engagement from learners has been hypothesized to require at least three factors: interest, fantasy, and challenge." (p. 117). Similar findings have been made by Woo (2014) in his study with 63 university students who, after an eight-week intervention, concluded that DGBL fosters more effective learning which correlates with students' learning motivation and cognitive load.

Research has also suggested that game-based learning environments are more engaging and motivating than traditional non-game-based instruction as they promote greater learner self-confidence. Jackson et al. (2012) and Papastergiou (2009) conducted studies where they contrasted game-based tasks or tools with non-game-based ones. Jackson et al. (2012) compared game-based reading comprehension software with similar non-game-based software. Their study, which included 36 university students from and EFL setting, showed better learning results for the non-game environment but higher engagement for the game-based system. On the other hand, Papastergiou (2009) conducted a pretest-postest design study to assess the learning effectiveness and motivational appeal of a computer game for learning computer memory concepts, compared to a similar non-game-based application, with identical learning objectives and content but devoid of the gaming aspect. The analysis of the results indicates that the game-based computer game was both more effective in promoting students' knowledge of computer memory concepts and more engaging than its non-game-based counterpart.

In the EFL context, there is still a need for empirical research into the effectiveness of DGBL for second language acquisition, which has come to be known as Digital Game-based Language Learning (DGBLL). There are a handful of studies that provide preliminary evidence of improved learning in the EFL arena. Alyaz and Genc (2016) reported that DGBLL leads to a great improvement in pre-service teachers' language skills development and in their attitudes towards the use of DGBLL in future teaching practices. In a similar vein, Kocaman and Kizilkaya-Cumaoglu (2014) showed the positive effects of two educational software systems for vocabulary learning - a gamified software and a non-gamified one. Interestingly, students who used the gamified software had better results than those who used the non-gamified version of the software.

The impact and effectiveness of DGBL in ELT in Chile has not yet been extensively researched. Thus, there is a need for evidence of its possible effectiveness in the many different learning contexts where English is part of the academic curriculum.

Student response systems and *Kahoot*-related research

Student response systems (SRSs) - also referred to as Learner Response Systems (LRSs), Personal Response Systems (PRSs), Classroom Response Systems, and simply as clickers

(Yoon, 2017) - have become increasingly popular over the past decade (Mork, 2014). Research into SRSs has yielded overall positive results regarding their impact on different aspects involved in the learning process such as motivation, engagement, performance, and timely feedback, particularly in higher education settings (Cardoso, 2011; Blasco-Arcas et al., 2013; Liu, Gettig, & Fjortoft, 2010). However, some drawbacks in the use of SRSs have also been reported, among which is the cost, teachers' reluctance to integrate new technologies into the classroom because of high perceived investment in terms of time and effort to develop an unknown system, and the potential frustration and unexpected technical failures (Blasco-Arcas et al., 2013).

Much of the research on the use of the SRSs has been conducted in different learning contexts such as management, physics, chemistry, psychology, yet, to a lesser extent on second language learning, particularly in Chile. Research on SRSs in English language learning reveal that students perceive SRSs as favourable tools for learning, as its use increases participation and the general enjoyment of classes, fosters interactions, and allows learners to self-assess and compare their performance with that of their peers (Cardoso, 2011), which, in turn, improves language skills.

Overall, a positive impact on learning has been observed from the DGBL and SRSs literature. *Kahoot*, in particular, conflates features from both DGBL and SRSs into a Game-based Student Response System (GSRS) and includes game features such as points, leaderboards, time limits, sound effects, and nicknames (Wang, 2015). Indeed, there are a number of empirical studies that have shown that GSRS technologies not only help increase students' motivation but also their academic learning outcomes. For instance, a pretest-posttest study with a view to determining the efficacy of *Kahoot* as a formative assessment tool conducted by Iwamoto, Hargis, Taitano, and Vuong (2017) shows significant differences in the scores of a high-stakes examination between psychology students who used Kahoot and those who used traditional methods. Iwamoto et al. (2017), in line with Iaremenko's (2017) findings, also suggest that the use of *Kahoot* improves students' academic performance by creating a fun learning environment. Likewise, Ismail and Mohammad (2017) conducted a survey study on the use of *Kahoot* with medical students in order to measure the perception of students towards *Kahoot* as a formative assessment tool. They found that Kahoot makes students more focused as "it caters to various learning styles" (p 24). Papastergiou (2009) indicates that DGBL has significant potential for increasing computer science students' learning motivation. Her study shows that students using game-based activities were more motivated than students using non-game activities. However, she suggested exploring the long-term learning effects and motivational impact of a game-based technology when used regularly. In the same vein, in an analysis of the effect of gamification in a computer-programming course on the learning experience and the students' motivation and performance, Panagiotis, Theodoros, Leinfellner, and Yasmine (2016) provide further support to the gains obtained from the gamified approach by means of tools such as *Kahoot*.

Similar gains were observed on different studies that employed the same design used by the researchers in this study. In fact, in most recent studies (Turan & Meral, 2017; Iwamoto et al., 2017; Wichadee & Pattanapichet, 2018) the impact of *Kahoot* on students' learning has been measured by means of quasi-experiments as research designs. For instance, Turan and Meral (2017) used a pretest-posttest design to test the effect of a game-based student response system (*Kahoot*) versus a non-game-based student response system (Socrative) within a Social Science class with seventh graders. Their study showed evidence of both higher test scores and higher engagement levels from the experimental group using the GSRS when compared to its non-gamified counterpart.

However scant, GSRS-related research in second language learning seems to evidence similar results to those found in other fields. Indeed, Iaremenko (2017), in her study on the impact of learning games on motivation, found that *Kahoot* fosters motivation in language students and shows a correlation between high energy levels of fun competition and increased motivation. Similar benefits to EFL students' motivation were found by Zarzycka-Piskorz. (2016) in her study on the potentials of gamification with university students. Regarding academic performance, Hung (2016) found that the use of *Kahoot* as a mean for flipping the classroom had a positive learning impact on EFL learners. Similarly, Wichadee and Pattanapichet (2018) measured the impact of *Kahoot* on students' learning performance and motivation. Their study revealed that *Kahoot* not only increased students' motivation but also enhanced EFL learners' academic performance after a twelve-week intervention with a sample of seventy-seven university students.

As can be inferred from the review of the relevant literature, a good deal of research done thus far in areas of knowledge outside English as a foreign language has primarily focused on the motivational aspects that MALL, DGBL, SRSs, and GSRS are capable of. The same applies to *Kahoot* in particular (Tan, Ganapathy & Kaur, 2018; Ismail & Mohammad, 2017; Iwamoto, Hargis, Taitiano, & Vuong, 2017; Licorish, George, Owen, & Daniel, 2017; Wang, Zhu, & Saetre, 2016). Indeed, to the researchers' knowledge, no published research studies on the use of and, more importantly, the impact of *Kahoot* (and GSRS at large) on English as a Foreign Language (EFL) learners' learning process have been conducted in Chile, which uncovers a gap that the present investigation intends to bridge. Therefore, there exists a dire need for studies on the impact of technological tools in education, despite the perceived benefits of technology in the classroom as "the evidence that the technology has made a measurable impact upon FL learning or teaching is quite limited" (Golonka, Bowles, Frank, Richardson & Freynick, 2014, p.88). Similarly, much of the research conducted in Chile has chiefly focused on experiences with or uses of ICTs rather than on their impact on actual learning and teaching (Jaramillo & Chavez, 2015; Hinostroza, Labbé, Brun, & Matamala, 2011).

Methodological Framework

Methodology and sample

The methodological framework of the present study draws from the principles of quantitative research. As far as the sample goes, participants in this study were vocational higher education students enrolled in the *Administración Pública* [Public Adminstration] programme at a technical college in Lota, Chile. The sample consisted of two intact groups: An evening group and a daytime group (experimental and control groups, respectively). The sample was made up of 50 students undertaking an ESP course, of whom 28 were part of the experimental group and the remaining 22 belonged to the control group. Participants' ages ranged from 18 to 56 years old. The gender distribution was 89% female students and 11% male students. The participants were given a consent form which also outlined the study, and indicated the rights to participate in or withdraw from the study at any time without any consequences.

Methods

Two quantitative methods were utilised in the present work: A pretest-posttest measurement and a survey. The pre and post-tests used in this research were achievement tests developed by

the researcher. They consisted of three sections which assessed vocabulary, grammar, and writing skills. Students had 60 minutes to take the tests. In order to explore students' perceptions of and attitudes towards the use of *Kahoot* in the English language classroom, a survey was thought to be best-suited. The survey used in this research is an adaptation from different instruments used in prior research on the same topic (Tan Ganaphaty & Kaur, 2018; Ismail & Mohammad, 2017; Llerena & Rodríguez, 2017). Adaptations were made in order to better fit the descriptors and topics to the needs of the present research. The survey consisted of two main sections: (i) a biographic data section to gather information concerning the participants' age, gender, and previous experience with *Kahoot*, and (ii) a four-point Likert scale survey section where 1 meant *strongly disagree* and 4 stood for *completely agree*. It was decided to include a four-point scale so as to force the participants to take a stance and avoid having students being neutral – as it often occurs on a five-point scale. By means of this scale, participants can indicate the extent to which they agree or disagree with the statements presented. The survey included 30 items broken down into four different dimensions. The four different dimensions addressed are fun, engagement, motivation, and learning utility.

Prior to implementation, all instruments used in the study were validated. Validation is often discussed under two rubrics: Reliability and validity. Reliability is referred to as the process of demonstrating that the data obtained is consistent from one data collection episode to another. Validation, in turn, refers to a fairly strong connection between the interpretation and the construct (Griffee, 2012). The validity of the instruments used in this study was addressed via expert judgment, from two researchers. In order to do so, an instrument was used to validate the data-gathering survey used in this investigation. Additionally, the survey was developed in the participants' mother tongue, Spanish, so as to avoid a bias that language misunderstanding may have produced. Besides, the survey was piloted with a group of twenty-eight students from a different program at the same institution. The students participating in the pilot survey were already users of the *Kahoot* app and were chosen because they shared similar biographical characteristics with the experimental group, such as age and gender distribution. Piloting the instrument allowed for reliability in terms of the clarity of the instructions and the language of the items.

The survey's reliability was measured by means of a Cronbach's alpha test. The first dimension of the instrument was highly reliable in the pilot (α = .91), surpassing the conventional value recommended by the literature of 0.70 for the Cronbach's alpha statistic (Bernardi, 1994), but not in the participant sample of the intervention. (α = .10). An item by item analysis revealed that by removing items 3 and 26 the reliability increased substantially (α = .80), so they were excluded from the calculation of the score for this dimension. The second dimension of the questionnaire (engagement) was highly reliable in the pilot (α = .84) and in the participant sample of the intervention (α = .70). The third dimension of the questionnaire (motivation) was highly reliable in the pilot (α = .87), but not in the participant sample of the intervention (α = .67). An item by item analysis revealed that by removing items 7 and 18, reliability improved (α = .71), so they were excluded from the calculation of the score for this dimension. Finally, the last dimension of the questionnaire was highly reliable in the pilot (α = .91) and in the participant sample of the intervention (α = .86).

Data Analysis

In the present work, both descriptive and inferential statistical measures were used to analyse the data. Measures of central tendency (mean, median, and mode) and measures of variability (standard deviation) were computed. However, as these types of statistics do not allow for generalizability of results from a particular sample to a whole population, inferential statistics

procedures were also employed in order to test statistical significance between the control and experimental groups as a result of the implementation. A repeated-measures ANOVA was conducted (Huck & McLean, 1975), considering the between-subjects factor a condition (experimental vs. control) and survey scores as the other within-subjects factor condition (pre-test vs. post-test). A preliminary analysis of the statistical power (Faul, Erdfelder, Langm & Buchner, 2007) showed that 34 cases were necessary to detect a medium effect size (f = .25) for a 95% confidence level and an observed power of 80%. Put differently, the sample employed was large enough to detect significant differences of medium effect size. The different statistical analyses were conducted through computer software called *Stata*.

Intervention

In order to determine which group would serve as control or experimental, and potentially avoid any potential biases involved in the selection of groups, the researcher flipped a coin to decide whether the evening or day time group would be assigned to the control and experimental groups. In order to answer Research Question (RQ) 1, regarding the impact of Kahoot on students' learning, students from both experimental and control groups sat for a pre-test to determine their prior knowledge on the content. In addition, students from the experimental group were asked to download the *Kahoot* app from the Play Store or the App Store after they sat for the pre-test.

The app was used by the participants in the experimental group at the beginning and end of every session over a period of 4 weeks. At the beginning of each session, the app was used as a review of the previous lesson and as an introduction to the new content of the current class. By the end of the session, the app was used once again to review the content covered on the day. The classes for both experimental and control groups were taught by the same teacher-researcher, in the exact same way, using the same materials and resources, and even at the same learning space. The participants in the control group were not exposed to *Kahoot* technology as a tool to review, introduce, and consolidate language content. Instead, they would review and be introduced to new content by means of traditional non-gamified methods.

Each *Kahoot* game consisted of 10 multiple-choice items or scrambled sentences. The items for the *Kahoot* games were written by one of the researchers based on the key content that was going to be on the upcoming test. Questions in *Kahoot* were aligned with the key content, but the actual wording of the items was not identical to the items used for the test.

By the end of the intervention period, both the control and the experimental groups sat for the same low-stakes achievement test in their respective classes. The test included three sections addressing grammar, structures, and vocabulary. The type of items used in the test mirrored those implemented during the teaching period for both experimental and control groups, by means of traditional worksheets and *Kahoot*, respectively. For instance, the grammar section in the test included ten multiple-choice items, the structures were assessed by means of ten scrambled-sentences, and eight gap-filling items were used for assessing vocabulary. Prior to the test, both groups spent an entire class reviewing the previous lessons. The control group reviewed the content by means of a study guide which covered all the topics for the test using the same type of items as in the test, while the experimental group reviewed the lessons by replaying all the *Kahoot* games that had been played until then.

In order to answer RQ2 regarding the participants' perceptions of and attitudes towards the use of *Kahoot*, they were asked to answer a survey which was administered a week after they sat for the test.

Results and discussion

Research question 1: The impact of *Kahoot* on students' English learning

The scores for control and experimental groups in both pretest and posttest are presented in Table 1. These scores were analyzed through a repeated-measures ANOVA. Results showed that the model was significant, $F(3, 48) = 6.72$, $p < .001$, $\eta^2 = .877$. The main effect of the condition (experimental vs. control) was not significant, $F(1, 48) = 1.95$, $p = .169$, yet the time effect was (pretest vs. posttest), $F(1, 48) = 129.38$, $p < .001$, indicating that the increase observed from the pretest to the posttest was statistically significant. Additionally, the interaction between condition and time was significant, $F(1, 48) = 11.44$, $p = .001$, indicating that the change from the pretest to the posttest was stronger in the experimental group. In fact, in the pretest there were no differences between the groups' scores, $t(48) = .36$, $p = .718$, but there were significant differences in the posttest scores, $t(48) = 2.42$, $p = .019$. Table 1 shows the mean scores (M) and standard deviations (SD) for the scores obtained from the pre and posttests in both groups.

Table 1
Treatment results

	Pretest		Posttest		Control vs. Experimental análisis
	M	SD	M	SD	
Control	12.64	10.11	21.73	10.22	F (1, 48) = 1.95, p = .169
Experimental	11.89	3.52	28.68	9.98	
Pretest vs. Posttest analysis	F (1, 48) = 129.38, p < .001				

The first question in this study sought to determine the impact of *Kahoot* on students' English language learning. Based on the results presented above, this study found that although both groups saw their scores increase from the pretest to the posttest, the treatment in the experimental group caused a much stronger increase, one that was statistically significant. Interestingly, the standard deviations of both groups were distant from each other in the pretest (10.11 vs 3.52), yet they were very close in the posttest (10.22 vs 9.98), which suggests that both groups were treated equally during the intervention period, the only difference being the use of *Kahoot*.

Scant literature on the impact of SRSs, DGBL, GSRS, and *Kahoot* on students' learning achievements is available. However, the findings of this study corroborate the gains reported in previous research from diverse subject areas. The findings of this study are consistent with those reported by Iwamoto et al. (2017), who showed significant differences in the results of high-stakes examination scores in psychology students who used *Kahoot* versus those who used traditional learning methodologies. The findings further support the idea that the game-based components promote more effective learning (Papastergiou, 2009). They are also consistent with the results of previous research which showed positive effects of two educational software for vocabulary learning - a gamified software and a non-gamified one –

where students who used the gamified software had better academic results than those who used the non-gamified version of the software (Kocaman & Kizilkaya-Cumaoglu, 2014).

The learning gains found in this study - operationalised as a posttest score increase - which mainly entail domains such as grammar, structure, and vocabulary, can be attributed to the fact that game dynamics mediated by technological devices allow for higher levels of engagement and student-centred learning in the classroom, which contribute to improving language learners thinking skills and confidence, and to helping students understand course content better (Hashmi, 2016). According to Woo (2014), using digital games promotes a more effective learning as it yields a positive correlation between students' learning motivation and cognitive load. Jackson et al. (2012), in turn, suggested that entertainment, one of the main features of digital games, supports learning "by stimulating engagement or by rewarding performance" (p. 116).

Research question 2: Students' perceptions of and attitudes towards the use of *Kahoot*

In order to answer the second research question, an attitude/opinion survey was administered to the experimental group a week after the posttest had been applied. The main goal of the attitude/opinion survey was to elicit data concerning the students' perceptions of and attitudes towards the use of *Kahoot* during the treatment period.

The biographical data obtained from the survey indicated that none of the respondents had used the app before. Although the reasons for not having used the app ever before are likely to be quite diverse, it may be an indication of a potential novelty effect that may have influenced students' perceptions and attitudes. 'Novelty effects', according to Zucker and Fisch (2019), are not always entirely positive in digital gaming environments. The authors explain that initial encounters with new technologies may, at times, cause high levels of anxiety, which are likely to decrease as more familiarity with the gaming technology is acquired.

The results of the survey broken down into dimensions are presented in Table 2. These results do not include items 3, 7, 18, or 26 of the survey which were not considered in the calculation of the score for Fun and Motivation dimensions. The exclusion of these items, in particular, was driven by attempts to improve the instrument's reliability.

It can be observed that all four dimensions were perceived very positively by the experimental group as measured on a four-point Likert scale, where 1 meant strongly disagree and 4 stood for completely agree. The closer to 4, the more positive the perceptions of or the attitudes towards the dimensions measured. The mean reported for every dimension showed that the vast majority of respondents agreed or completely agreed with the items presented in the survey. Also, standard deviations indicated that scores from the survey were grouped tightly around the means. The distribution of responses across the four options for each item is presented in Appendix 1.

Table 2.
Final survey

	M	SD
Fun	3.67	0.34
Engagement	3.47	0.37
Motivation	3.42	0.48
Utility for learning	3.30	0.36

The first dimension, *Fun*, was the best perceived from the four dimensions measured. This is a very interesting finding as fun plays a key role in game-based learning, which corroborates Iaremenko's (2017) findings, which suggest that by creating a fun class environment, *Kahoot* can improve academic students' performance. In a similar vein, the results of this dimension further support previous research findings (Mork, 2014; Ismail & Mohammad, 2017; Licorish et al., 2017) which indicated that, compared to a traditional approach, game-based learning promotes more effective learning by means of a more enjoyable environment.

Equally high mean scores were obtained for the second dimension of the survey, *Engagement*, which lies at the core of the learning process as engaged students "exhibit curiosity in the learning content and maintain focus during class sessions" (Licorish et al., 2018). The mean score for this dimension was 3.47 on a scale of 1-4, with a standard deviation of .37. These results indicate high levels of self-reported engagement mediated by the use of *Kahoot* in the English class. The use of *Kahoot* fostered students' participation and improved students' engagement. Indeed, the lessons where *Kahoot* exhibited 100% class participation as evidenced by the reports produced by the app and the students' responses in the survey, in stark contrast with the observed engagement in the control group. The findings of this study confirm the notion that higher levels of engagement can result from the use of SRSs and GSRSs, as suggested by the relevant literature (Cardoso, 2011; Blasco-Arcas et al., 2013; Liu, Gettig, & Fjortoft, 2010).

The mean for the third dimension, *Motivation*, followed the tendency of the previous two dimensions and suggests that the use of *Kahoot* fosters students' motivation in the experimental group. Most students agreed or completely agreed that they paid more attention to the class content in order to win in the *Kahoot* sessions. In fact, the idea of winning and competing were motivational factors that were highly valued by the respondents. Once again, the findings observed in this study mirror those of prior research on the effect of DGBL and GSRSs on students' motivation in subject areas that are different from ESL/EFL (see Tan, Ganapathy & Kaur, 2018; Ismail & Mohammad, 2017; Iwamoto, Hargis, Taitiano, & Vuong, 2017; Licorish, George, Owen, & Daniel, 2017; Wang, Zhu, & Saetre, 2016). Put differently, the motivational effects of GSRSs found in other areas were also true for the EFL context of this particular study. Regarding EFL, this finding further supports that of Hung (2016) who showed evidence of increased motivation in an EFL setting through the use of *Kahoot* as a GSRS.

The last dimension measured in the survey, *Utility for Learning*, obtained the lowest mean of all four dimensions in relative terms as it still scored high on the 1-4 scale (3.30). They agreed that *Kahoot* facilitated learning; helped them retain new knowledge; and increased their understanding of the class content. They also perceived *Kahoot* as an effective tool to receive instant feedback and reflect on their learning, both of which are crucial aspects of the learning process. These results are consistent with those of previous research (Papastergiou, 2009; Ismail & Mohammad, 2017; Liu, Gettig, & Fjortoft, 2010) and suggest that GSRSs - and *Kahoot*, in particular - are highly appreciated as a learning tool by higher-education vocational students and those technological devices are not only valued as useful tools by young students.

Conclusions, limitations, and suggestions for further research

The increased use of technologies and mobile devices in education in general, and in EFL/ESL settings in particular, does not yet feature a robust correlate of empirical evidence "that the

technology has made a measurable impact upon FL learning or teaching is quite limited" (Golonka et al., 2014, p.88). The same claim is true of Chile (Jaramillo & Chavez, 2015).

GSRSs, a relatively novel technology that combines DGBL with the so-called *clickers* into a smartphone app, has been shown to support students' motivation and engagement, and to increase their enjoyment of classroom activities (Mork, 2014; Ismail & Mohammad, 2017; Licorish et al., 2017). However, scant evidence as to whether GSRSs, *Kahoot* in particular, improve students' learning achievements is available, particularly in EFL settings. The current study explored how the integration of *Kahoot* into the EFL classroom contributed to vocational higher-education students' enjoyment, motivation, engagement and learning.

As far as the impact on students' learning achievements are concerned, this quasi-experimental study suggests that the use of GSRSs such as *Kahoot* is capable of producing significant differences in learning gains as measured by students' scores on a low-stakes English language achievement test. Additionally, the perceptions of and attitudes towards the use of *Kahoot* in the EFL classroom were clearly very positive in the four dimensions, namely *Fun*, *Engagement*, *Motivation*, and *Utility for Learning*. *Fun* and *Engagement* were the most highly-valued dimensions, closely followed by *Motivation* and *Utility for Learning*. The significant increase on learning can then be attributed to the fact that game dynamics, mediated by technological devices, such as smartphones, promote higher levels of enjoyment, engagement, and student-centred learning in the classroom than do traditional classroom tasks, which in turn contributes to enhancing language learners thinking skills and confidence and fostering course content understanding (Hashmi, 2016). Thus, these findings confirm the influence of high-levels of fun, engagement, and increased motivation on students' academic performance and learning achievements (Blasco-Arcas et al., 2013; Iaremenko, 2017).

Some of the limitations that need to be acknowledged are the following: The first one deals with the span of the study and time constraints which did not allow us to further explore the impact of *Kahoot* over a longer period of use and find out whether the use of GSRSs foster long-lasting learning in higher-education vocational students. Finally, because of the nature of the instrument used to explore students' perceptions of and attitudes towards the use of *Kahoot*, this study failed to gain a deep understanding of the underlying reasons for responding the way they did in the survey. Giving students space to express their thoughts and feelings about the use of *Kahoot* may have proven richer and more meaningful.

Further research aimed to investigate whether language learning gains behave similarly depending on learners' proficiency level or across sociolinguistic variables such as gender, age group, or socioeconomic status. In future research, a delayed posttest could be used to determine the learning efficacy and impact of *Kahoot* over a longer period. Additionally, the collection of qualitative data may contribute to gain a deeper understanding of the students' perceptions and attitudes and to uncover other possible intervening variables that were not considered in this research.

Acknowledgments

This work was supported by the Chilean National Research Agency Fondecyt, Project number 11170031

References

Ahn, T. & Lee, S. (2015). User experience of a mobile speaking application with automatic speech recognition for EFL learning. *British Journal of Educational Technology, 47*(4), 778–786. doi:10.1111/bjet.12354

Alyaz, Y. & Genc, Z. (2016). Digital game-based language learning in foreign language teacher education. *Turkish Online Journal of Distance Education, 17*(4), 130-146.

Bernardi, R. A. (1994). Validating research results when Cronbach's Alpha is below .70: A methodological procedure. *Educational and Psychological Measurement, 54*(3), 766-775. doi:10.1177/0013164494054003023

Blasco-Arcas, L., Buil, I., Hernández-Ortega, B., & Sese, F. (2013). Using clickers in class. The role of interactivity, active collaborative learning and engagement in learning performance. *Computers & Education,* 62, 102-110.

Cardoso, W. (2011). Learning a foreign language with a learner response system: the students' perspective. *Computer Assisted Language Learning, 24*(5), 393-417.

Faul, F., Erdfelder, E., Lang, A., G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*, 175–191. doi: 10.3758/BF03193146

Golonka, E., Bowles, A., Frank, V., Richardson, D. & Suzanne Freynik (2014). Technologies for foreign language learning: a review of technology types and their effectiveness. *Computer Assisted Language Learning, 27*(1), 70-105.

Griffee, D. (2012). *An introduction to second language research methods: Design and data.* California: TESL-EJ Publications.

Hashemi, M., & Najafi, V. (2011). Using blogs in English language writing classes. *International Journal of Academic Research, 3*(4), 599-604.

Herrera, L., Cruz, M. & Sandoval, M. (2014). Using personal portable devices as learning tools in the English class. *How, 21*(2), 74-93.

Hinostroza, J. E., Labbé, C., Brun, M., & Matamala, C. (2011). Teaching and learning activities in Chilean classrooms: Is ICT making a difference? *Computers & Education, 57*(1), 1358-1367.

Huck, S. W., & McLean, R. A. (1975). Using a repeated measures ANOVA to analyze the data from a pretest-posttest design: A potentially confusing task. *Psychological Bulletin, 82*(4), 511-518.

Hung, H. T. (2017). Clickers in the flipped classroom: bring your own device (BYOD) to promote student learning. *Interactive Learning Environments, 25*(8), 983-995.

Ismail, M., & Mohammad, J. (2017). Kahoot: A Promising Tool for Formative Assessment in Medical Education. *Education in Medicine Journal, 9*(2), 19–26

Iwamoto, D., Hargis, J., Taitano, E., & Vuong, K. (2017). Analyzing the efficacy of the testing effect using Kahoottm on students. *The Turkish Online Journal of Distance Education, 18*(2), 80-93.

Jackson, G. T., Dempsey, K. B., & McNamara, D. S. (2012). Game-based practice in a reading strategy tutoring system: Showdown in iSTART-ME. In H. Reinders (Ed.), *Digital Games in Language Learning and Teaching* (pp. 115-138). London: Palgrave Macmillan.

Jaramillo, C. & Chavez. J. (2015). TIC y educación en Chile: Una revisión sistemática de la literatura. *Nuevas Ideas en Informática Educativa*, 11, 221- 231.

Kocaman, O., & Kizilkaya-Cumaoglu, G. (2014b). The Effect of Educational Software (DENIS) and Games on Vocabulary Learning Strategies and Achievement. *Education and Science, 39*(176), 305-316.

Licorish, S., Li George, J., Owen, H., & Daniel, B. (2017). "Go Kahoot!" Enriching Classroom Engagement, Motivation and Learning Experience with Games. Proceedings of the 25th International Conference on Computers in Education. New Zealand: Asia-Pacific Society for Computers in Education.

Llerena, E., & Rodriguez, C. (2017). Kahoot! A digital tool for learning vocabulary in a language classroom. *Revista Publicando*, *4*(12), 441-449.

Marshall, P. (2013). *Research methods: How to design and conduct a successful project*. London: Constable & Robinson.

McCoy, B. (2016). Digital distractions in the classroom phase II: Student classroom use of digital devices for non-class related purposes. *Journal of Media Education, 7*(1), 5-32.

Mork, C. (2014). Benefits of using online student response systems in Japanese EFL classrooms. *JALT CALL Journal, 10*(2), 127–137.

Oz, H. (2015). An Investigation of Preservice English Teachers' Perceptions of Mobile Assisted Language Learning. *English Language Teaching*, *8*(2), 22-35.

Panagiotis, F., Theodoros, M., Leinfellner, R., & Yasmine, R. (2016). Climbing up the leaderboard: An empirical study of applying gamification techniques to a computer programming class. *Electronic Journal of e-learning*, *14*(2), 94-110.

Papastergiou, M. (2009a). Digital game-based learning in high school computer science education: impact on educational effectiveness and student motivation. *Computers and Education*, *52*(1), 1–12.

Saavedra, I., & Brauchy, J. G. (2017). The use of digital video making projects to enhance motivation in the English Foreign Language Teaching high school classroom. Language, Education, and Culture Journal, (4). Retrieved from https://plci-journal.jimdo.com/app/download/9660373471/BrauchyJ_Saavedra I.pdf?t=1500481410

Tai, Y. (2012). Contextualizing a MALL: Practice design and evaluation. *Journal of Educational Technology & Society, 15*(2), 220-230.

Tan, D., Ganapathy, M., & Kaur, M. (2018). Kahoot! It: Gamification in Higher Education. *Pertanika Journal of Social Science and Humanities*, 26, 565-582.

Toohey, K., Dagenais, D., & Schulze, E. (2012). Second language learners making video in three contexts. *Language and Literacy*, *14*(2), 75-96.

Turan, Z., & Meral, E. (2018). Game-Based versus to Non-Game-Based: The Impact of Student Response Systems on Students' Achievements, Engagements and Test Anxieties. *Informatics in Education*, *17*(1), 105-116.

Wang, A. I., Zhu, M., & Sætre, R. (2016). The effect of digitizing and gamifying quizzing in classrooms. In Proceedings of the 10th European Conference on Games Based Learning. University of the West of Scotland, Paisley, Scotland.

Wang, M. (2014). The current practice of integration of information communication technology to English teaching and the emotions involved in blended learning. *The Turkish Online Journal of Educational Technology*, *13*(3), 188-200.

Wichadee, S., & Pattanapichet, F. (2018). Enhancement of performance and motivation through application of digital games in an English language class. *Teaching English with Technology*, *18*(1), 77-92.

Yakut, A. D., & Aydın, S. (2015). An experimental study on the effects of the use of blogs on EFL reading comprehension. *Innovation in Language Learning and Teaching*, *11*(1), 1-16.

Yoon, Seo Young. (2017). Using learner response systems for EFL classrooms: Students' perspectives and experience. *Multimedia-Assisted Language Learning, 20*(2), 36-58.

Zarzycka-Piskorz, E. (2016). Kahoot it or not? Can games be motivating in learning grammar?. *Teaching English with Technology*, *16*(3), 17-36.

Zucher, L., & Fisch, A. (2019). Play and learning with KAHOOT!: Enhancing collaboration and engagement in grades 9-16 through digital games. *Journal of Language and Literacy Education*, *15*(1), 1-15.

Appendix 1

Dimension	Item	Strongly disagree	Disagree	Agree	Completely agree
Fun	I looked forward to playing Kahoot.				
	I felt excited when playing Kahoot	0.00%	0.00%	25.00%	75.00%
	It was easy to use Kahoot.	0.00%	0.00%	39.29%	60.71%
	I found Kahoot fun	0.00%	0.00%	7.14%	92.86%
	I enjoyed playing Kahoot	0.00%	0.00%	25.00%	75.00%
	I felt positive when playing Kahoot	0.00%	0.00%	35.71%	64.29%
	I liked the competitiveness in our Kahoot sessions	0.00%	14.29%	39.29%	46.43%
Engagement	I responded as accurately as possible to each item or question in each Kahoot session.	0.00%	0.00%	46.43%	53.57%
	I responded as quickly as possible to each item or question in each Kahoot session.	0.00%	0.00%	64.29%	35.71%
	I focused on the ítems or questions in each Kahoot session	0.00%	3.57%	53.57%	42.86%
	I responded to each item or question in each Kahoot session	0.00%	0.00%	39.29%	60.71%
Motivation	I did the Kahoot quizzes not only because the teacher requested it.	0.00%	21.43%	42.86%	35.71%
	I wished to do better on the Kahoot sessions than most other students in the class.	0.00%	10.71%	35.71%	53.57%
	I was eager to learn via Kahoot	0.00%	3.57%	42.86%	53.57%
	I was motivated by the prospect of wining in these Kahoot sessions.	0.00%	3.57%	32.14%	64.29%
Utility for learning	I wish Kahoot was also used in other subjects	0.00%	3.57%	21.43%	75.00%
	Kahoot helped me to retain my new knowledge	0.00%	7.14%	25.00%	67.86%
	Kahoot enhanced my understanding on the subjects	0.00%	7.14%	53.57%	39.29%

	Kahoot was an effective method to correct my misconceptions on the subjects	0.00%	10.71%	42.86%	46.43%
	Kahoot motivated me to learn more.	0.00%	3.57%	32.14%	64.29%
	Kahoot was a distraction to the real class activities.	67.86%	21.43%	10.71%	0.00%
	Kahoot was an effective method for reflective learning.	0.00%	7.14%	46.43%	46.43%
	Kahoot helped me reinforce my learning	0.00%	0.00%	53.57%	46.43%
	Kahoot facilitated my learning on the subjects.	0.00%	7.14%	50.00%	42.86%
	Kahoot helped me being prepared for my test.	0.00%	7.14%	42.86%	50.00%
	Kahoot was an effective method to provide feedback	0.00%	0.00%	39.29%	60.71%