

Kahoot!: EFL instructors' implementation experiences and impacts on students' vocabulary knowledge

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Abstract

Enthusiasm for mobile-assisted language learning (MALL) in EFL classrooms at Korean universities is substantial and growing among both instructors and students. The question of how effective MALL is for English learning, however, remains largely unanswered. This pilot study seeks to explore the efficacy of the mobile application Kahoot! while simultaneously evaluating the implementation of the application through the eyes of the instructors who use the program. This study uses a mixed-methods quasi-experimental design incorporating inferential statistics, which are complemented by survey and focus group methodology for qualitative analysis. While the experimental group showed a marked increase in vocabulary knowledge, the differences failed to be statistically significant for this small sample size and short duration. However, the instructors provided critical insights into the use of Kahoot! in the EFL classroom that will improve pedagogy and guide additional and more rigorous future research.

Keywords: vocabulary acquisition, MALL, BYOD, gamification, student response system

Introduction

Many EFL instructors are excited about the possibility of improving student learning through mobile assisted language learning (MALL). Simultaneously, however, they can be overwhelmed by the sheer volume and variety of applications available for MALL. Consequently, the fundamental challenge of repurposing and integrating new technology into the classroom involves our understanding of three elements: sound pedagogy, the technology's capabilities, and how to use each in an effective curriculum (Puentedura, 2013). The conundrum of how to integrate technology is especially problematic for the EFL classroom, as studies have shown that EFL instructors use technology to present the information they rarely move beyond information presentation (Harmandaoğlu Baz, Balçıkanlı, and Cephe 2018; Ding et al. 2019). Thus, three recent innovations in MALL lay the foundation for this study: student response systems (SRS) (Cha, 2018), gamification (Hamari, Koivisto, and Sarsa, 2014), and the bring your own devices (BYOD) strategy (Burston, 2017; Hung, 2017b; Wu, 2019). This study seeks to determine the effects of one MALL application, Kahoot!, a game-based student response system (GSRS) using BYOD technology, on student vocabulary acquisition. Furthermore,

we seek to explore instructors' experiences with the implementation of Kahoot!, specifically in a university in South Korea (hereafter Korea). To that end, we ask the following research questions:

- Do Kahoot!-based on vocabulary drills improve vocabulary acquisition?
- What specific experiences do instructors report after implementing the Kahoot! BYOD GSRS in Korean EFL classrooms?

Literature Review

Case (2018) reported that instructors in Japanese EFL classrooms are genuinely excited about Kahoot!, BYOD, and GSRS. To deepen our understanding of Kahoot! in the classroom, this literature review provides background information on motivation and engagement, describes the current educational technology environment in EFL classrooms, reviews the limitations of previous MALL studies, and elaborates on specific research studies that inform the current study.

Engagement and Motivation in Korean EFL

An honest assessment of student and instructor engagement and motivation in Korean EFL would likely describe a milieu of relative disengagement and demotivation (DeWaelche, 2015). Guilloteaux's (2016) analysis of Korean EFL students' engagement "broadly support[ed] the existing literature" in concluding that "just over one student in ten could be described on average as engaged in classes, and half of the students showed engagement levels that put them at risk of low achievement" (p. 40). Similarly, in their study of secondary students in Hong Kong, Lee, Yu, and Liu, (2018) found, bluntly, "the secondary students in the study were not motivated to write in English" (p. 183). The consensus in the literature is that motivation and engagement in Korean EFL are relatively low. That fact, combined with Case's (2018) report on the excitement surrounding Kahoot!, provides an important impetus for this study.

Educational Technology in EFL in Korea

In terms of access to the Internet and mobile technology, the International Telecommunication Union reports that, as of 2018, 95.1% of Koreans have Internet access, and 99.7% use a cell phone (*International Telecommunication Union: Statistics*, 2019). Given that college students are more likely to adopt technology than the population as a whole, we can conclude that mobile phone and Internet access is virtually universal among Korean university students. The question remains, however, as to how much that access transfers into EFL instruction. Early in the 21st century, 'clickers'—audience-response systems built into lecture halls—were seen as a way to interact more widely and effectively with students (Kenwright, 2009). In the ensuing decade, clicker technology has become superfluous, as the clicker utility has been incorporated into mobile phone applications, enabling BYOD. Simultaneously, according to Chuang (2015), "more and more education-related mobile apps have been developed" (p. 464). Importantly, gamification is garnering growing interest and implementation in EFL

classrooms (Dellos, 2015; Michos, 2017). Similarly, online delivery of vocabulary exercises, including through smart devices, is increasing in Korea (Ko & Goranson, 2014; Park & Lee, 2017). Consequently, the increased adoption of GSRS through BYOD merits empirical analysis of learning outcomes.

Definitions. Recognizing that vocabulary largely writ is at the core of our questions in this paper, the operational definition of vocabulary, acquisition, and knowledge provide essential foundations for the argument. Unfortunately, the precise definitions of these terms are both complex and contested (Coady & Huckin, 1996; Ma, 2009; Milton, 2009). For this pilot study, our definitions align more with Ma's "intuitive answer to the question of what vocabulary knowledge entails" which, "certainly contains a large amount of truth" (p. 27). Thus, we consider vocabulary knowledge to be, "knowing the meaning of the word and how to use it appropriately" (Ma, 2009, p. 27). Vocabulary acquisition then is the increase in that knowledge over time regardless of whether the cause of those changes is incidental or instructional.

The earliest student response systems (SRS) were "audience response systems . . . used primarily by businesses for focus groups" in the 1960s (Collins, 2007, p. 83). Educators soon saw the potential for instruction, but these clicker systems were untenable for widespread implementation due to the proprietary and expensive hardware involved (Collins, 2007; Wang et al., 2016). Thus the clicker generation gave way to the "Bring Your Own Device wave [which] has opened up for a new generation of SRSs" (Wang et al., 2016, p. 729). Hung (2017a) concurred, "due to the growing prevalence of mobile technologies, clicker adoption associated with students' personal mobile devices . . . opens up an alternative model: bring your own device (BYOD)" (p. 984). Relying on BYOD hardware is the first step in broadly expanding the use of mobile technology to benefit classroom learning. Additionally, the software needs to be conceptualized and developed. As indicated above, SRS has been a common term used in the field awash with other terminology including teaching English as a language of open sources (Cakir, 2016), smart learning (S. Y. Kim, 2017), learner response systems (Cho, 2018; Yoon, 2017), and of course the more common SRS (Cha, 2018; Hung, 2017a; McLaughlin & Yan, 2017; Wang, 2015). In this paper, we will use SRS as an umbrella term to cover these various terms. Finally, how the Kahoot! software approached student response and interaction is also essential to the study. Gamification is currently a trendy term in EFL studies which is used to describe a wide variety of games introduced into the classroom, from simple games like Hangman and Pictionary converted from L1 purposes (Dodigovic, 2018), to integrated and complex simulations like BaFa BaFa (Carroll, 1997). Kahoot! certainly fits into this category. While in education we use gamification as an umbrella term, Michos (2017) emphasizes the "difference between concepts of Game-Based Learning and Serious Games and Gamification, because in gamification game elements add an extra layer over existing educational activities, while GBL and SG use games as the training or learning medium." (p. 511).

While the parameters of what gamification *is* and *is not* are fairly clear, the mechanisms that produce learning benefits are much more difficult to tease out. Qualitative results from Zarzycka-Piskorz's (2016) study of Kahoot! implementation indicate that students believed that "game elements used in a non-game context" for example "fun, reward, leader boards, avatars, points, challenges . . . appear overall to be effective in motivating the students" (p. 32). However, Karaaslan, Kilic, Guven-Yalcin,

and Gullu, (2018) emphasize course specificity and other factors as they found that gamification is most effective when “course-specific synchronous and asynchronous digital games . . . are intrinsically motivating . . . ; fun . . . ; authentic . . . ; allow self-reliance . . . ; [and] experiential” (p. 66). A final caveat is that teasing out the most important factors influencing gamification can be exceedingly difficult. Wang and Lieberoth (2016) attempted to understand through quasi-experiment and survey the relative importance of two key gamification elements, points, and audio, across a variety of factors: concentration, engagement, enjoyment, motivation, and effort, perceived learning outcome, and classroom dynamics. They conclude that audio and points were seen as impactful in all factors *except* for learning outcomes. Ultimately, our study uses Kahoot! to combine the benefits of gamification and SRS into a *game-based student response system*, or GSRS (Abidin & Kamaru Zaman, 2017; Graham, 2015; Wang, 2015; Wang & Lieberoth, 2016).

Why Settle on Kahoot! and GSRS?

Kahoot! was released in 2013 and thus is a relatively new software application (“About Kahoot!,” n.d.; Aktekin et al., 2018). Additionally, Kahoot! represents the current cutting edge educational applications used in EFL by incorporating SRS (Collins, 2007; Wang et al., 2016) and moving beyond clickers to BYOD (Hung, 2017b; Wang, 2015). Importantly, while some studies have explored other software application options (i.e., Socrative, Quizzizz, Duolingo, and others (Cha, 2018; Guaqueta & Castro-Garces, 2018; Yoon, 2017), or self-designed systems and repurposed non-education apps like Google forms (Cho, 2018; Chuang, 2015), early research suggests a good number of benefits from using Kahoot! (Bicen & Kocakoyun, 2018; Licorish et al., 2018). Plump and LaRosa’s (2017) study found “nearly universal student support for Kahoot!” (p. 155). After using it in a course, the authors suggested numerous specific advantages to Kahoot! including no cost, ease of use, engagement, and motivation. Similarly, Graham (2015) was enthusiastic about Kahoot!, pointing specifically to motivation and engagement benefits. Iaremenko (2017) described its ease of use (even for novice players), its gamification effects, and the fun gameplay environment. Moreover, because gamification “as an academic topic of study is relatively young, and there are few well-established theoretical frameworks or unified discourses” (Hamari et al, 2014, p. 3030), the Kahoot! application itself deserves a well-designed analysis.

Perhaps, however, the greatest justification for using Kahoot! is found in the fact that few studies of language learning applications have been completed in collaborative or comparative ways. For example, Guaqueta and Castro-Garces (2018) developed an instructional program that integrated Duolingo and Kahoot! which helped students learn not only for the short term but “for life as they learned new strategies that will help them go on their own” (p. 69). Similarly, Karaaslan et al. (2018) compared five different applications and found that gamification elements in Kahoot! like, “the interaction and sense of community . . . the competition . . . exchange of ideas . . . [and] . . . funny moments . . . led to better recall and recycling” (p. 65) for language learning. Finally, Chaiyo and Nokham (2017) set out to compare three applications--Kahoot, Quizzizz, and Google forms--used as an SRS to compare the applications and their effects. They “recommend the use of Kahoot and Quizzizz in the class as a tool to enhance learning

experience” (p. 182), and their data show Kahoot! performing somewhat better than Quizizz.

Limitations of Previous Research

An additional justification for the study can be found in the spate of research meta-analyses conducted several years ago for mobile application use within both gamification and MALL (Baran, 2014; Burston, 2014, 2015; Hamari et al., 2014). While the authors focus on different fields within education—Baran (2014) on use in teacher education, Burston (2014, 2015) on use in language learning, and Hamari et al. (2014) on gamification in information communication technology more broadly, including business and education--similar patterns emerge in their findings. For example, both Baran (2014) and Hamari et al. (2014) find that the research papers studied rarely state their theoretical or conceptual perspectives. Our review found the following conclusions were reached in all of the aforementioned meta-analyses:

- a trend of increasing integration of mobile technologies in the classroom,
- a combination of qualitative and quantitative analyses,
- the vast majority of the studies were, however, implementation studies with broadly qualitative analysis,
- “variations exist in perceptions, attitudes and usage patterns” Baran (2014, p. 17),
- motivation and engagement are critical factors and primarily reported as beneficial, and
- nearly every study reports at least some positive results.

The researchers note a shortage of high-quality studies, specifically of language learning studies incorporating mobile learning, gamification, and SRS (Burston, 2014, 2015; Hung, 2017b). Burston (2014) points out that a substantial majority (60%) of MALL studies have been implementation studies marked by "the unevenness of the articles and the great diversity of their sources" (p. 104). In explicitly examining MALL studies regarding learning outcomes, Burston (2015) points to a few specific design weaknesses that we seek to address in this preliminary study. Of the 291 MALL implementation studies out of a total of 575 articles reviewed, Burston narrows to only 35 by eliminating those with durations less than one month, those with samples of less than ten, and those that failed to analyze results quantitatively. Aside from the frequent and fatal flaws of too short duration, too small sample, and no quantitative analysis, the author describes in detail several additional factors that compromise some of the remaining studies:

- Failure to track actual usage (of the applications) . . .
- Presence of uncontrolled variables . . .
- Inadequate control group descriptions . . .
- Presence of confounding variables . . . [and]
- Inadequate statistical analysis. (pp. 5-9)

Ultimately, Baran (2014), Burston (2014, 2015) Hamari et al. (2014), and Hung (2017b, 2017a) point to a significant need for more and better quality studies on the

application and effect of implementing MALL, SRS, and gamification in the classroom. We hope to begin to address these gaps and weaknesses through this study.

Findings that inform this study

As reviewed above, published papers on MALL applications report almost universally positive results (Burston, 2015), including the few high-quality studies reviewed. Yet, Burston (2015) reports that four “studies, all focusing on vocabulary, reported no significant differences” (p. 16)--out of eleven vocabulary studies. Because vocabulary practice is one of the primary applications of MALL technology studied in the literature, “58% (11/19) of the MALL studies under analysis” (Burston, 2015, p. 12), we selected vocabulary outcomes as a primary focus of this study. What does recent MALL research say about Kahoot! and vocabulary acquisition? Our literature search found only four studies that dealt explicitly with Kahoot! and L2 vocabulary acquisition. Two studies (Guaqueta & Castro-Garces, 2018; Medina & Hurtado, 2017) conducted in South America dealt specifically with EFL instruction, Kahoot! and vocabulary acquisition. The descriptive statistics used for analysis show an increase in knowledge; however, without inferential statistics, we cannot know the significance of those results. In another study, Iwamoto, Hargis, Taitano, & Vuong (2017) *did* use inferential statistics and found statistically-significant improvement in vocabulary knowledge, but the study was conducted in a general psychology class with L1 learners. The only study we could find using Kahoot!, inferential statistics, EFL students, and focusing on vocabulary is Wichadee & Pattanapichet (2018) conducted in Thailand. They found that the students using Kahoot! showed statistically significant improvement in a vocabulary and grammar test, as well as on a post-instruction motivation survey relative to the control group.

Kahoot!, as a gamified, BYOD, SRS for EFL vocabulary instruction, has shown a great deal of promise. Moreover, the specific characteristics of the Korean university EFL environment appear to provide particularly fertile ground for studying the effects of this MALL application. We found no analyses of the roles and perspectives of instructors in the implementation of this particular application, particularly in Korean EFL classrooms. Ultimately, the limitations of previous studies have motivated and guided us in this pilot study of Kahoot! in Korean-university EFL classrooms, a study designed to overcome the limitations of previous studies.

Methods

The underlying purpose of the current pilot study was to prepare the researchers for a more extensive, and more elaborate study of Kahoot! with Korean EFL students at the university level. To answer the limited research questions proposed for this study, we adopted a mixed-methods approach: primarily following Creswell (2008) for the quasi-experimental quantitative methods and Charmaz (2006) for the coding and qualitative methods for phenomenological analysis. The data for the first research question regarding vocabulary acquisition are analyzed quantitatively, and data for the second question on instructors’ experiences are analyzed qualitatively.

Setting and Participants

The setting for this study is a medium-sized university in central Korea, where the academic calendar begins in March. Within the university, all students are required to take English language classes in their first two years, which, at this particular university, means at least eight semesters of English classes during the spring, summer, fall, and winter terms. This particular study was conducted with newly-matriculated students in their first spring semester of freshman coursework.

Two types of participants joined the study: students and instructors. There were 24 student participants: 12 males and 12 females. The control group included 13 (six males and seven females) while the experimental group included 11 (six males and five females). The instructors involved in design and implementation included 15 instructors (nine males and six females). Of the 15 instructors, eight completed the online survey and participated in the final focus group (five males and three females) including the researchers. The eight participants are profiled in Table 1.

Table 1
Instructor participants

Name (pseudonym)	Nationality	Years of teaching experience	Years teaching EFL	Years of EFL at a Korean university
George	USA	9	4	4
Jackie	USA	10	10	6
Dennis	USA	35	20	10
Wynona	Canada	20	10	5
Johan	South Africa	20	4	2.5
Jimin	USA	23	12	1
Robert	Canada	12.5	11.5	5.5
Jeff	USA	15	10	9

As this is a pilot study, only two classes of students met the criteria for the duration and completion of Kahoot! activities described below. The experimental class had a male instructor, and the control class instructor was female. However, we solicited feedback regarding implementation from all instructional team members. Informed consent was solicited and received from all participants.

Description of the Instructional Intervention

“Kahoot! is a game-based student response system that transforms temporarily a classroom into a game show” (Wang, 2015, p. 218), which, as of this pilot study, breaks-down into three question types: "quiz" which has multiple-choice questions with correct answers, "jumble" which requires placing items in the correct order, and "survey" which has multiple choice questions with no correct answers. We determined that the multiple-choice "quiz" option was best suited to vocabulary instruction. Consequently, the researchers designed and distributed to experimental-group instructors, several quizzes for the target vocabulary in each chapter of the coursebook, which is part of a commercially available series from a major university press. The coursebooks, in turn, serve as the central curricular outline for each course. Two types of quizzes were constructed: One matching the English definition to the target word, and another using

sentence completion with the same words, which align with Ma's (2009) definition of vocabulary knowledge as "knowing the meaning of the word and how to use it" (p. 27). Instructors in the experimental group were required to use at least one Kahoot! quiz per week, as either a preview or review activity; instructors in the control group were required to have at least one 5-10 minute vocabulary exercise on the same vocabulary set. The duration of the intervention period was at least ten weeks of the fifteen-week semester.

Data Collection

We collected three distinct types of data to help answer the two research questions. Concerning the initial question on vocabulary acquisition, a pre-test and a post-test were designed to assess target vocabulary knowledge from the text units to be covered over the semester. Each test contained 25 questions, which were selected randomly from each unit of the textbook, and a roughly equal number of terms from each chapter covered. The test was delivered online and in-class using the students' mobile phones. Only those students who completed both of the tests were included in the data analysis.

To understand the second research question regarding instructor experiences implementing Kahoot! in their classes, we collected qualitative data in two ways: an online survey and a focus group. The survey includes 20 Likert-scale questions, which are listed in Table 2, and eight open questions on Kahoot! implementation (Appendix 1). The focus group interview lasted about one hour. In the focus group, we reviewed the survey questions and explored the emergent questions/themes from the survey's open questions. The focus group's semi-structured interview is in Appendix 2.

Data Analysis

The results of the quantitative pre/post-test were analyzed with IBM's SPSS software. We raised two sub-questions: "Does Kahoot! aid vocabulary acquisition?" and "Does Kahoot! aid vocabulary acquisition better than traditional classroom activities?". Because of the small size of the experimental group in this pilot study, and because the results violated the assumption that there were no outliers, a Wilcoxon Signed-Ranks Test was used to consider the within-group differences for the experimental group. Conversely, the larger sample size and absence of outliers permitted us to use a more-rigorous independent-samples t-test to examine the differences between the experimental and control groups.

For instructor data, the Likert-scale questions were analyzed using simple descriptive statistics; the open-ended questions and focus group responses were considered qualitatively through open and axial coding, following Creswell (Creswell 2008; Creswell & Clark 2010). The coding process revealed that the participants were discussing Kahoot! primarily in terms of its strengths and weaknesses; consequently, we reanalyzed the codes via a SWOT (strengths, weakness, opportunities, and threats) analysis following the recommendation of Colpaert (2006).

Limitations

The most significant limitation was that, as a pilot study, a primary goal is preparing the materials, instructors, and techniques for future implementation. A final limitation is

the lack of full curricular control to remove confounding factors, as reviewed in the Results and Discussion section. Nonetheless, we have confidence in the results we present herein.

Results and Discussion

In this discussion section, we explore our research questions about the students' performance results and the instructors' feedback regarding implementation and how they align with previous research.

Kahoot!'s Effect on Vocabulary Acquisition

We consider our initial research question, "Do Kahoot!-based vocabulary drills improve vocabulary acquisition?" in two different ways. Initially, we conducted a within-group comparison of experimental group results to test their knowledge of the target vocabulary covered in the course textbook. The pretest mean was 14.50 and the posttest mean was 15.58: an increase of 1.08 points on the 25-point test, or 4.32%. However, while students' scores did increase during the intervention, a Wilcoxon signed-rank test showed that over the ten weeks, the addition of Kahoot! vocabulary quizzes to regular instruction did not produce a statistically significant increase in target vocabulary knowledge ($Z = -1.491, p = 0.136$).

We noticed that raw scores of the students in the control group *decreased* as much on the post-test as the experimental group's score had *increased*; thus, we conducted an independent samples t-test to see if the differences between the experimental group and the control group reached statistical significance. As discussed above, this sample shows no outliers and is double the size of the within-group comparison, meaning none of the assumptions of the independent-samples t-test are violated. Consequently, an independent-samples t-test was conducted to compare the effect on target vocabulary acquisition between Kahoot! quiz intervention and traditional pen and paper classroom instructional conditions. However, as with the within-group comparison, we found no statistically-significant difference in the vocabulary acquisition between that Kahoot! intervention group ($M=1.08, SD=3.40$) and traditional instruction group ($M=-0.91, SD=3.78$) conditions; $t(21)=1.33, p = .197$.

Consequently, while we must reject the hypothesis that students perform better after using Kahoot! to study vocabulary, we must also reject the suggestion that students perform more poorly using the application. Instructors should feel free to select either the instructional method. Additionally, the reality that differences in the scores consistently favored Kahoot! relative to traditional pen-and-paper activities is tantalizing enough to move forward with a larger and more precise implementation of this study.

Instructors' Thoughts on Implementing Kahoot!

Instructor data came from two sources: an online survey and a focus group. Instructors' responses concerning the Likert-scale questions are summarized in Table 2.

Table 2
Average responses to 5 point Likert-scale questions

Question	mean	sd
Students work harder in class when we play Kahoot! quizzes.	3.88	0.64
Kahoot! is an appropriate use of smartphones in class.	4.75	0.46
Students look forward to using Kahoot!.	4.38	0.74
Kahoot! increases overall participation in English class.	4.38	0.52
Students take Kahoot! quizzes seriously.	3.75	0.89
Kahoot! increases students' enjoyment of the class.	4.88	0.35
Kahoot! provided fun competition for students.	4.50	0.76
Kahoot! encourages active learning in class.	4.00	0.76
Kahoot! is useful for addressing students' questions about vocabulary.	3.75	0.71
Kahoot! should be used to teach English vocabulary.	4.00	0.93
Kahoot! is more effective than other ways of teaching vocabulary.	3.50	0.93
Kahoot! is a good way to introduce vocabulary to EFL students.	4.13	0.64
Kahoot! provides students with a clear learning objective.	3.88	0.83
Kahoot! provides students with a measurable goal.	4.13	0.64
I can provide feedback effectively using Kahoot! in class.	4.25	0.71
I take an active role in my classes when I use Kahoot!.	4.13	0.83
It is easy to supplement my textbook with Kahoot!.	4.50	0.76
It is beneficial to supplement my textbook with Kahoot!.	4.75	0.46
Kahoot! is useful as a <i>preview</i> activity.	4.50	0.53
Kahoot! is useful as a <i>review</i> activity.	4.63	0.52

The instructor respondents agreed that Kahoot! had a positive impact on all of the criteria, to a greater or lesser extent. However, the most and least agreed-upon items can give a sense of which direction the instructors were leaning in their attitudes toward Kahoot!. Variables considered least favorably were: "Kahoot! is more effective than other ways of teaching vocabulary", "Kahoot! is useful for addressing students' questions about vocabulary", and "Students take Kahoot! quizzes seriously". The literature is generally positive about the various GSRSs, so we have few references for the weaknesses of GSRS and Kahoot!—even relative weaknesses. The first two comments indicate that, while the instructors were positive about Kahoot!, they are not entirely convinced of its efficacy relative to other teaching options and specifically direct instruction. The last item calls into question whether the students are seriously and actively involved in learning while taking Kahoot! quizzes. On the positive side, the three items that the instructors agreed most strongly about were: "Kahoot! increases students' enjoyment of the class", "Kahoot! is an appropriate use of smartphones in class", and "It is beneficial to supplement my textbook with Kahoot!". Each of these three represents a different notion. The first two are mentioned in the literature as positive aspects—enjoyment (Karaaslan et al., 2018; Zarzycka-Piskorz, 2016) and BYOD (Hung, 2017b)—but the third option of using Kahoot! to supplement the course textbook was a pedagogical option not discussed in the literature we reviewed.

Regarding the open responses on the online survey and the focus group interview data, our analysis produced the following insights: 1) positive comments outweighed negative ones, 2) a SWOT analysis offers a useful heuristic to analyze the participants'

thoughts, and 3) the instructors offered new and vital insights not discussed in the literature we reviewed. Considering the strong positivity of the instructors is a useful place to begin, but is also an artifact in part of the character of the survey and interview's "what worked and what did not?" approach. In raw quantitative descriptions of the codes, instances of codes showing a positive response to using Kahoot! outnumbered instances indicating a negative response to the application by three to one. Moreover, even before we completed the first round of open coding, it became clear that the SWOT framework, developed for strategic business management in the 1960s (Pershing, 2006), would be a useful tool to explore the instructors' thoughts. A detailed look at the codes generated shows that our instructors focused heavily on internal factors (strengths and weaknesses) at a rate of two to one over external factors (opportunities and threats) (Table 3). Thus, a gross analysis of the instructors' thoughts indicates a strong positive response to using Kahoot!, and a tendency to focus on their own internal experiences in using the application rather than how external factors might affect implementation.

Table 3
SWOT framework applied to codes

	Strength	Weakness	Opportunity	Threat
Code Frequency	44	15	24	8

Themes arising from axial coding. After completing the coding process, several notions rose to the top of our consideration. A shortlist of those themes covers five categories: Motivation, fun and engagement, multiple intelligence factors, technical issues, and, vitally, pedagogical work.

Motivation. That GSRS, BYOD, and Kahoot! in particular, have a strong motivational impact on students is well documented and indeed is probably the most definitive recommendation for classroom use in the literature (Burston, 2015; Graham, 2015; Plump & LaRosa, 2017; Zarzycka-Piskorz, 2016). Indeed, "motivating" was the most frequent code we applied by a factor of nearly two over the second-most-common one. For example, Jimin commented that when she told students, "you are going to have a Kahoot ... to look forward to. I think that's a really good idea". Moreover, our participants delved deeply into a nuanced view of the motivational impacts. Instructors commented that the effects were different in different sorts of classes. "In my apathetic class, one of the worst classes I ever had, [when they played Kahoot!] was the only time there was any spark in them whatsoever", Wynona noted. Moreover, she pointed out that those differences mattered on the individual-student level as well as the whole-class level: "Even the girl, the super texter, Cindy (pseudonym), who never did anything in class, would participate in [Kahoot!]".

Similarly, Jackie indicated that her less-motivated students got involved with Kahoot!: if "they're engaged in something [to do with English learning], then ... that's good, yeah, in my opinion". Wynona also emphasized that that motivation resulted in engagement: it "gave them something to look forward to and, with the review, I knew that they were participating for the most part, pretty much all of them". Jeff pointed out that using their BYOD smartphones (Chuang, 2015; Hung, 2017a) is a key motivating factor. "Any excuse they have to use the smartphones is one they enjoy, ... The more opportunities they get to use their smartphones, [the more] they appreciate [class]".

Jackie summarized the aforementioned thoughts: “they came to expect it, they came to like it”.

At the same time, however, the instructors noted a critical weakness regarding motivation when they pointed out that Kahoot! seemed to have demotivating effects for some students. Johan commented that the vast majority of students liked Kahoot!, “except for one student. I realized afterwards, he couldn't see on the screen well and he didn't want to use his glasses”, implying that the differences between GSRS and a traditional textbook and lecture pedagogy might impact student motivation for surprising reasons. Additionally, a few instructors mentioned that competition can be demotivating to students who do *not* win: “they're getting a lot of the wrong answers, then they might not do it the next class” (Wynona), and “I sort of wondered if [never winning] maybe discouraged the ones that were always losing” (Dennis). Jackie summarized the thoughts on motivation, stating that Kahoot! is a motivating factor in class for “the winners, half of the class. Then, the other half it didn't really [motivate]”.

Fun and engagement. The second most frequently coded theme was “fun”. While fun could be analogous to motivation, it was discussed in such a different light that it was worthy of a separate code. The distinction is that, while motivation seemed to be discussed in terms of the students' inferred internal state, “fun” was about their actions in the classroom. Jackie alluded to the students' active engagement in class when by noting that, for the students “who did do it usually, they seemed like they were having fun, and they were getting into it”. The literature also makes critical distinctions between motivation and engagement and was one of the common benefits associated with various iterations of GSRS (DeWaelche, 2015; Guilloteaux, 2016; Iaremenko, 2017; Wang & Lieberoth, 2016; Zarzycka-Piskorz, 2016).

In our focus group, engagement was often associated with the competitive aspects of the game (Karaaslan et al., 2018), which the instructors noted were generally motivating, though they were demotivating for some students. Robert elaborates on the competitive interaction and collaboration in his class:

I had three Chinese students, so sometimes the three Chinese students placed in the top three. The next Kahoot, they were out, and the top three Koreans were in, and it seemed to go back and forth with each set. So maybe they were in “Kahoot!s” with each other.

However, Jeff emphasized that the character of that competition is essential, “because it lets them be competitive without harming them”, alluding to the previous discussion of how losing regularly can be demotivating. Wynona agreed with Jeff's interpretation, saying “it was nice to see them competing in a manmade, fun way. Like Jeff was saying before there are no consequences. It was fun, but they were into it”. At this juncture, the researchers wish to emphasize that academic competition is a recognized, significant issue in the Korean education system, perhaps more so than in most other countries (Byean, 2015; Chong, 2005; B. Kim, Lee, Kim, Choi, & Lee, 2015). Also, Jimin contrasted Kahoot! and the more-rigid rote memorization and lecture pedagogies commonly found in Korea, saying “I think it kind of gives them the idea of a fun way to learn instead of the Korean way”. Indeed, Robert also emphasized students' enjoyment of the difference and novelty of Kahoot! and how those distinctions impacted students'

classroom engagement: “I mean, it's a fun factor for kids to have some kind of enjoyment in the class.”

Multiple intelligence factors. At the most granular level, the instructors pointed to a variety of multiple intelligence factors that add strength to the Kahoot! program as a tool for EFL learning. The first multiple intelligence theme was raised through a discussion of how the pictures and videos in Kahoot! perform. Robert was excited about how beneficial the imagery is:

You can see a picture. They can look at the picture and get an idea of what they are supposed to know in terms of vocabulary ... to hear the words and they see the image, so it helps consolidate exactly what the word means in their mind. So they can apply it to choosing one of the four answers at the scale. So it's very helpful. It's visual. It's very powerful.

Jeff reiterated and refined Robert's observations using variations on terminology from Gardner (2011): “I think students are much better at visual association than they are at just the regular vocabulary. It's called the Visual-Spatial Intelligence, or Visual-Spatial Strength”. The instructors felt that using more of the students' talents – rather than just the verbal-linguistic intelligence employed in most language classrooms – produced important benefits. Another intelligence discussed by the instructors was kinesthetics, activating body movement particularly in the “game show” aspects of Kahoot! (Graham, 2015; Wang & Lieberoth, 2016; Wichadee & Pattanapichet, 2018; Zarzycka-Piskorz, 2016). George and Jeff discussed how students got physically active and engaged:

George: Kahoot! is a nice psychomotor response. You're using a full-body type response. Right? Did you see that? ...

Jeff: Well, you mean like [a] full-body response?

George: Yeah, was it useful, like seeing the whole page, I'm seeing this on the screen, I'm thinking about it here, maybe I'm hearing the teacher read the question, and now I've got to push the button and compete with [another student].

Jeff: Yeah, I was seeing that. I was seeing that they were engaged in it.

The instructors saw adding kinesthetic activities as an added benefit for EFL learning. A final multiple intelligence talent that the instructors pointed out was musical intelligence, regarding the background music of Kahoot!. “The background music is really interesting in the application,” according to Jeff, to which Jackie replied that, around the holiday, Kahoot!'s developers had updated its background music to reflect Halloween: “[T]hey changed it to a creepy version? . . . Little spooky”. Later in the discussion, Jeff summarized how Kahoot! accesses all of these different sensory input channels through different multiple intelligences, noting that “it seemed to brighten things up when I put on the Kahoot [*which starts with characteristic theme music and a brightly colored screen*]. It's almost like smiles break out. [Class] is fun now”.

Technical issues. One area of weakness and a potential threat the instructors discussed was the various technical issues with using Kahoot!. Some issues prove common to almost any application. For instance, Dennis had difficulty because “a lot of my students started standing up in class so they could see the screen clearly”, which was a problem Jackie noticed in class as well: “a lot of my students had trouble seeing, too”.

Moreover, Kahoot!, like any application, has its idiosyncrasies, one of which Jeff enumerated: “There's a feature on Kahoot!s for you to randomize the answers that keeps it from being [the same answer choice each time]”. However, George explained that that particular issue is an artifact from making quizzes using a template spreadsheet provided by Kahoot!'s developers to make creating the quizzes faster. George noted that “[the researchers] were hoping you would randomize them because, when you make [Kahoot!s using their template] spreadsheet, you can just put the correct answer as option A and [then click “randomize” before deploying the quiz]. It saves a lot of time in making them”. In this case, what appeared to be a technical difficulty was part of the learning curve for accessing the higher functionality of the program.

Similarly, instructors struggled practically with naming conventions for participating students, as Jackie and Johan discuss:

Jackie: They would waste a lot of time trying to make up funny nicknames. So, that one little [issue].

Johan: And at the beginning, they also need to get used to getting into it, and I also had to find the randomize function and all that stuff, but one or two or three [days] on the line you get set with it. But what I also found was sometimes I would tell them, “Okay, today use your own name for this.”

While on the surface, it may seem to be a minor issue with the application, naming issues do represent part of the planning and learning curve that instructors need to think through.

However, the overall consensus was that these difficulties were worth the time invested. As Jeff elaborates, “[students] have the tech around them all the time. This is a very technologically-advanced country, and all my students have smartphones. Every single one. So, I think it is appropriate [to play Kahoot! in class]”. Ultimately, the instructors agreed strongly that Kahoot! was easy to implement in their classrooms. When George inquired, “was it easy to implement Kahoot!/? Was it easy to..., like the logistics of it, was it easy to go from you-start-class [time, to] Kahoot!-time, on to whatever else you're doing?” a cascade of agreement came from Jeff, Jimin, Wynona, and Jackie.

Pedagogical work. The final and the most important category we will discuss is the pedagogical aspects of the Kahoot! application. Unlike some of the other themes the instructors raised, pedagogical work covers all aspects of the SWOT analysis. One pedagogical strength of the program was how it activates latent vocabulary and, thus, saves instructional time. “It was aiming to be beneficial back in other schools I've done. We would have vocabulary tests as part of the curriculum. This served a similar role in that it does review and introduce vocabulary,” according to Jeff, which is precisely how Johan described his use of Kahoot! in his classroom, “[In previous semesters], I did vocabulary teaching in class, but not this semester. With these groups, that [Kahoot!] was my vocabulary exercise. I didn't do anything else with them”. He was using Kahoot! to increase teaching efficiency while activating the students' latent knowledge.

Peer-to-peer teaching is another strength that Jimin pointed out in the discussion. She argued against the contention that the character of Kahoot! made it passive instruction:

I don't think [playing Kahoot!] was that passive because ... I can hear them, I understand Korean, so [I know what] they were talking about, they were discussing whatever vocabulary they missed ... during each question. Whoever missed their question asks, "The answer, why is it wrong?" The other one says, "No, you got it wrong because that's what you missed" or "That's what it is." So, they were talking after each question. So that's what I'm saying. Students learn right on the spot.

As Jimin indicated, she has the advantage of being fluent in the students' L1, which enabled her to understand students' side conversations and know that they engaged in peer-to-peer learning and teaching through Kahoot!.

A final major area often coded as a threat was Kahoot! in relation to other aspects of the curriculum. As with any curricular change, instructors know to expect some struggles. Jackie points to those sorts of tensions regarding the "time crunch" to "cover the curriculum":

One thing about last semester that I sort of had difficulty with was, there was just too much that I had to do in too little time, because we had the portfolios, so I had to get that done, and then . . . There was just so much other stuff I had to do that sometimes it was hard to properly cover the book material and the Kahoot! and the portfolio, so I think if I had had a two-hour class instead of an hour and a half, it would've worked a little better.

Jeff experienced a similar adjustment in his pedagogical learning curve with Kahoot! "This was the problem I had with last semester because we had the writing project, we had the portfolios, so that didn't leave a lot of opportunities to do it", and Jackie confirmed that thought, noting that "that was a challenge". Jimin faced similar challenges in incorporating the new application into the classroom. She noted that "I didn't have enough time to use it. I didn't have enough time to do it because I am a new teacher [at the university]. I was taking over after somebody, and then all those other books, the writing portfolio". Fitting Kahoot! within an instructor's course planning was only one of the pedagogical issues our participants raised.

Kahoot! as a vocabulary tool can be used for a variety of pedagogical purposes: preview, review, activating latent knowledge, and others. The instructors, however, found themselves doing additional work to maximize the utility of the application in their classes within their idiosyncratic teaching styles. For example, Wynona found using it as a review activity worked best for her, noting that "you have to do the review, and [Kahoot!] really helps. Especially with my apathetic bunch". Johan discussed using Kahoot! as a pedagogical "carrot" to motivate students:

So, I used it in that class as a motivation. [I] told them, "Okay, we have half an hour. You have time to finish this task. When everyone's finished with this task, we can do a Kahoot!". Then, they would finish it, so they can do the Kahoot!s.

The various opportunities Kahoot! provided as a pedagogical tool were at the forefront of the instructors' minds, and the pedagogical work to determine how to maximize efficacy was an essential part of their learning curve.

Moreover, when to do a Kahoot! quiz in a specific class period became a critical point of concern for each unique class. As Jackie recalled:

I tried doing them at the end, but it was too hard to judge how long it would take. So sometimes I wouldn't be able to finish it, and then class would end, or I would finish it early, and there would be five or ten minutes where there wasn't time to start something new. So I found just doing it at the beginning, reviewing what I had done in the previous lesson worked the best, just sort of as a refresher.

Jeff came to similar conclusions and established “a routine around the Kahoot!s, because it was a good way for me to preview the vocabulary for the class. ... an opening activity. It would be the first thing we did after attendance”. The recommendation of some of our instructors was to use Kahoot! as a preview activity, yet others like Johan and Dennis reported using Kahoot! quizzes as closing activities. Ultimately, personal teaching styles seem to be the crucial factor among our instructors

A final point instructors raised regarding the interplay between Kahoot! and pedagogy was how cultural differences sometimes characterize the EFL instructor as an entertainer. These differences, in turn, improve the class atmosphere and learning. Jimin explains, "because we are teachers from out of Korea, they look at us as an entertainer. We dance with music or whatever. I think it kind of gives them the idea of a fun way to learn instead of the Korean way." By "the Korean way," Jimin was referring to differences between pedagogies employed by Western instructors versus those used by their Korean counterparts. The Korean way means a relative reliance on instructor-centered curricula and instruction, and importantly, assessments that reward rote memorization through high stakes tests. Several of the instructors commented on their instructor-as-entertainer activities as they taught with Kahoot!. George's observation was thus: “I'm a unique-looking individual in Korea; tall, hairy, kind of portly. They love watching me dance to the music”. Jimin admitted to dancing as well, confirming "I danced with the music".

Similarly, Jackie commented on her dancing and the students' response: “I did sort of do a little dance when the music came on, and they thought that was funny”. Ultimately, our analysis of the instructor's experiences elicited from the focus group interview shows new insights into implementing Kahoot! as a pedagogical tool for Korean EFL classrooms. These insights arise from previously considered questions of motivation, fun, and engagement and more-novel considerations such as multiple intelligences, technical issues, and pedagogical work. Our instructors' insights should provide a helpful guide to other instructors hoping to implement Kahoot! in their classrooms.

Conclusions

While our expectations were guarded in this pilot study, we were rewarded with remarkable results. The literature contends that games-based student response systems using BYOD technology offer benefits in motivation, engagement, and fun in classroom competitions, but that such systems and technologies suffer from gaps in rigorous quantitative analysis of implementation in foreign language classrooms. We set out to create a more-rigorous study with two research questions in mind: Does Kahoot! aid vocabulary acquisition? and what are instructors' experiences implementing Kahoot!?

The experimental group students' score increase within-group and between themselves and the control group in target vocabulary knowledge over this period was not statistically significant. Importantly, the control group's performance decreased during the intervention, which has implications for English education and assessment before and after university matriculation in Korea. We conclude by noting that the results align with Burston's (2015) meta-analysis, which showed that many MALL vocabulary studies failed to show statistical significance. Simultaneously, the results do not support the use of "traditional" methods over Kahoot! and the encouraging differences in scores provide the impetus for a full study.

Rich data and meaningful interpretations did result from our exploration of the second research question on instructors' experiences implementing Kahoot!. A rough descriptive analysis of the instructors' survey responses reiterated those noted in the literature (Hung, 2017b; Karaaslan et al., 2018; Zarzycka-Piskorz, 2016) in that the instructors found the students were having more fun and using their phones appropriately. However, beyond the literature, our participants noted that Kahoot! can effectively supplement the textbook. On the negative side, however, not all of the instructors were deeply convinced that Kahoot! would be more effective than other, more traditional classroom pedagogies, or that the students were deeply engaged in learning English when playing Kahoot!.

An interesting emergent point was how our coding fell quickly, but unintentionally, into a strengths, weaknesses, opportunities, and threats (SWOT) framework (Pershing, 2006). Within that framework, the instructors' focus was three to one on positives (S&O) versus negatives (W&T). Additionally, their focus was two to one on the internal factors (S&W) versus external ones (O&T). Ultimately, the qualitative analysis proved the most valuable. Again, the instructors' thoughts mirrored the results in the literature in finding that motivation, engagement, and fun were primary benefits and their top reasons for recommending Kahoot! as a teaching tool (Wichadee & Pattanapichet, 2018; Zarzycka-Piskorz, 2016). However, unlike many of the reports in the literature, our instructors were somewhat cautionary, urging Kahoot! adopters to watch for demotivation in some students. Moreover, our instructors commented that Kahoot! provides essential opportunities for students to use different sensory input channels that activate the different intelligences that Gardner (2011) describes. They noted that musical, visual-spatial, and kinesthetic intelligences are all activated in ways different than in the traditional Korean EFL classroom and believe strongly that this activation aids student learning. On the negative side, they enumerated some of the technical issues involved with implementing Kahoot! in their classes, like question set-up, naming conventions, and seeing the screen; however, they noted that these problems are usually minor and less of an issue than other programs they have used.

The final, critical, and most revealing area arising in their focus group discussion was the pedagogical work involved, which is mostly unmentioned in our review of the literature. Participants marveled at the utility of substituting Kahoot! for the dry, rote vocabulary activities of the past, and were pleased with the peer-to-peer teaching that Kahoot! created. They dealt with external threats to incorporating the application in their teaching from curricular demands and last-minute changes. Simultaneously, the instructors endeavored through trial and error to determine the best time during each class meeting to use the Kahoot! quizzes for themselves and their students. They sorted out which pedagogical purposes from preview to review to assessment worked best. In the

end, our participants found great benefit in crossing cultural barriers to bring fun and excitement to their teaching and their students through Kahoot!

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Appendix 1

Online survey open questions:

The following questions asked for open responses.

- What worked well with Kahoot! this semester?
- What did NOT work well with Kahoot! this semester?
- How did you use Kahoot! in class?
- How would you use it differently in the future?
- What shortcomings does Kahoot! have? How did/would you address them?
- Were some quizzes more-effective than others? How or why?
- Summarize your gut feeling about using Kahoot! this semester.
- Any other input?
- Are you willing to be interviewed regarding your experience in the study? If so, please leave your contact details here.

Appendix 2

Focus group questions:

- How did you use Kahoot!? What was your experience with it?
- How did you fit it into your curriculum?
- Overall, how useful is Kahoot!?
- What worked well? What didn't?
- Are Kahoot! quizzes "better" at the beginning or end of class?
- In longer classes, did it work well after breaks?
- What issues were there regarding implementation?
- Does playing Kahoot! at the end of the class provide a motivational reward for students?
- Was Kahoot! useful in presenting information?
- Did you find Kahoot! relevant? Useful?
- How well did it pair with what you were teaching from your textbook?
- Was it easy to implement Kahoot! and integrate it with the rest of your lesson?
- Did it help you meet any type of teaching objective?
- What is the optimal frequency of use for Kahoot! in an EFL class?
- Is there a difference in effectiveness between regular use and sporadic use of Kahoot! quizzes?
- Do any benefits or hindrances of Kahoot! impact the rest of the class meeting?
- How effective was it at presenting vocabulary words?
- On a day-to-day basis, was the point of Kahoot! quizzes clear to teachers and students?
- Did Kahoot! encourage class participation?
- Did anonymity effect student participation?
- Did you notice that typically-quiet students might have been talking more or outperforming their more-extroverted peers on quizzes?

- Did every student participate in the quizzes? Did student participation hinder the quiz's usefulness?
- Did it create healthy competition in the class, or was it too passive?
- Was there a full-body, active response to Kahoot! quizzes? Was it up to your standards for class engagement?
- Did it encourage complex thinking?
- Did you quantitatively assess Kahoot!?
- Did you link Kahoot! to a class participation score?
- Did the same students win the quiz game every time?
- Did a lot of students seem to be submitting random answers in hopes of simply scoring points?
- Was it important for students to use their smartphones in class?
- Did Kahoot! create a sort of game-play fantasy for students? If so, did it motivate students both during the quiz and in-class afterward?
- Was Kahoot! visually appealing? Did that effect its usefulness?
- In the quizzes, how did vocabulary words and visual cues, such as pictures, work together to present information to students, or did they?
- Did Kahoot! fit into the cultural context we are teaching in? That is, is it appropriate for Korean university EFL students?