

Student Views on the Use of Online Student Response Systems: The Kahoot! Case

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To cite this article:

Akkus, I., Ozhan, U., & Cakir, H. (2021). Student views on the use of online student response systems: The Kahoot! case. *Journal of Qualitative Research in Education*, 25, 235-254. doi: 10.14689/enad.25.10

Abstract: Student response systems effectively collect and collate students' responses, allowing teachers to provide immediate feedback to learners, thereby preventing a decline in students' attention and motivation. In this study, a student response system instrument called Kahoot! was used. The study was conducted as a 4-week case study in an undergraduate course and a quiz consisting of 10 questions was created each week. Student views and recommendations were collected with an open-ended interview form. The obtained data were analyzed by content analysis, one of the qualitative analysis methods. The study findings were grouped under different codes, and it was determined that the majority of the students were of the view that the Kahoot! application improved course attendance, provided repetition of the learned topics, increased the motivation and attention. Furthermore, they stated as pre-service teachers that the Kahoot! Application should be used at the end of theoretical lectures and courses in the classroom and the number of questions should be increased.


Keywords: Student response systems, Kahoot!, game-based learning, student engagement


Article Info

Received: 07 Aug. 2020
Revised: 24 Oct. 2020
Accepted: 20 Jan. 2021

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Introduction

The learning and teaching methods, techniques, and materials are continually improved based on technological advances because the innovations and changes that the 21st century introduced to individuals' lives also affect their learning and teaching styles (Korkut & Akkoyunlu, 2008). The educational and instructional courses are conducted using various methods, application environments, and materials (Seferoglu, 2006). The course environments are sometimes constructed with a certain curriculum and in other cases, using independent methods. However, an effective course topic or material may not necessarily be transformed into an adequate learning environment alone. (Meyers & Jones, 1993; Wieman, 2007). It was reported that such learning environments are not student-centered and do not provide effective or active learning (Armbruster, Patel, Johnson & Weiss, 2009; Cubukcu, 2012). Previous studies demonstrated that the methods and techniques that encourage students to attend the course rendered the course more active and supported it (Deslauriers, Schelew & Wieman, 2011; Hake, 1998; Wieman, 2007). Many instructors expect more classroom interaction and participation. Today, many technological environments and tools are used to increase interaction and participation in the classroom (Wang & Tahir, 2020). The construction of an interactive classroom environment that will be student-centered, encourage student participation, and provide an active learning environment is beneficial for students (Bicen & Kocakoyun, 2018; Blood & Neel, 2008; Cameron & Bizo, 2019; Galil, Mayberry, Chan, Hargis & Halilovic, 2015; Hall, Collier, Thomas & Hilgers, 2005; Keser, 2005; Sun, 2014). It is known that there are some problems in creating such an environment (Ertmer & Ottenbreit-Leftwich, 2013). One of these difficulties is students' inability to adapt to the classroom environment and avoid academic emotions such as embarrassment and frustration that are behind the said inability (Hwang, Wong, Lam & Lam, 2015; Kaiser & Wisniewski, 2012). Some digital materials are utilized to overcome these problems (Clark & Mayer, 2016; Çağıltay et al., 2007). One of these digital materials that aim to instruct student-centered courses (Gauci, Dantas, Williams & Kemm, 2009), create an active learning environment (Martyn, 2007), provide motivation (Cain, Black & Rohr, 2009; Hall et al., 2005; Wang & Tahir, 2020), promote critical thinking skills (Trees & Jackson, 2007), problem solving skills (Beatty, Gerace, Leonard & Dufresne, 2006) and participation (Blood & Neel, 2008; Carnaghan & Webb, 2007) is the student response systems (SRS).

SRS is an effective feedback tool that stimulates participation in a course or a topic in an environment where quizzes are constructed with audio, video, and text elements (Cameron & Bizo, 2019; Carnaghan, Edmonds, Lechner & Olds, 2011; Egelandstad & Krumsvik, 2017; Heaslip, Donovan & Cullen, 2014; Wang & Lieberoth, 2016). The SRS is a digital material that could be encountered in different fields, especially in learning environments. This material, which enhances interaction and participation in the classroom, emerged under different names in various fields and industries, such as electronic voting systems, audience response systems, classroom response systems, and SRS (Stav, Nielsen, Hansen-Nygaard & Thorseth, 2010; Wang & Tahir, 2020). This environment, known as the SRS in education and training environments, is a digital

technology where students can respond instantly to questions posed on the system in a classroom or in a different educational environment (Chaiyo & Nokham, 2017; Gok, 2011; Penuel, Boscardin, Masyn & Crawford, 2007; Stav et al., 2010). This technology is known to be incorporated into a system through an electronic device (a clicker) that the users utilize to respond (Galal et al., 2015). However, with the emergence of the internet, web 2.0 tools and mobile technologies, a new generation of Web-based SRSs has emerged (Toth, Logo & Logo, 2019). This online SRSs possess essentially the same structure although they contain different interfaces and elements. It was observed that the development and popularity of SRSs led to their use in different industries, mainly in education and instruction (Chui, Martin & Pike, 2013). The main focus of these systems is education, instruction, and students and they enable the assessment of the course by the students with the aim to increase participation and attention (Galal et al., 2015). A list of the most popular online web-based SRSs is provided in Figure 1.

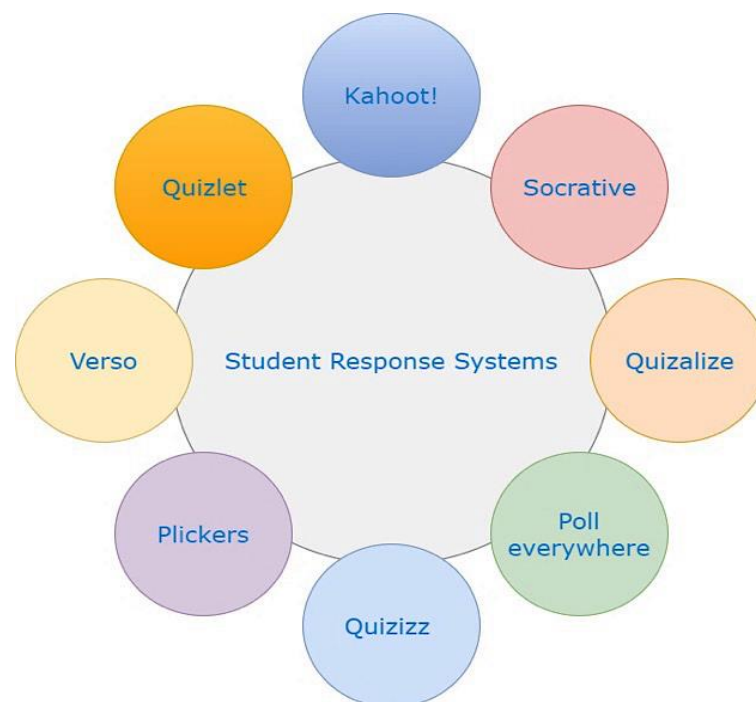


Figure 1. Popular online web-based SRSs

Today, several web-based SRSs are offered to students to promote participation in the class, make the instruction more enjoyable and attain learning goals (Icard, 2014; Plump & LaRosa, 2017, Wang & Tahir, 2020). Kahoot!, one of the most popular SRS applications, is prominent with its ease of use and its ability to make the course more fun and interesting, promote participation, promote participation, and provide feedback facilities (Bicen & Karakoyun, 2018). Previous studies conducted on Kahoot! demonstrated that it is a digital game-based learning tool (Bicen & Karakoyun, 2018; Cameron & Bizo, 2019; Dellos, 2015; Plump & LaRosa, 2017; Nguyen & Yukawa, 2019). Game-based learning facilitates learning for both the student and the teacher,

improves the course's efficiency, student motivation, interest, and participation through game-based tools (Bicen & Kocakoyun, 2018).

Game-based multiple choice questions, discussion questions, questionnaires, and puzzle games could be designed with Kahoot! (see Figure 2).

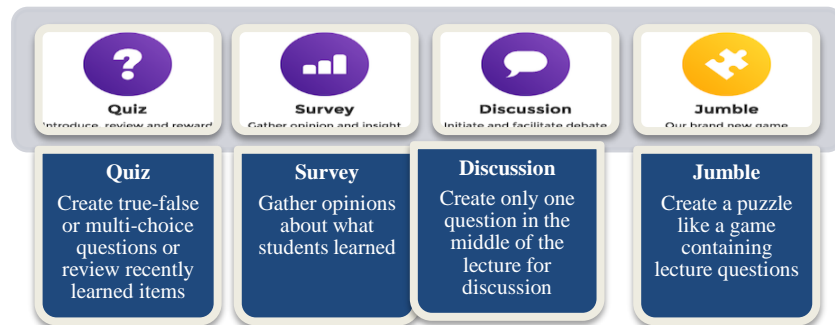


Figure 2. Kahoot! test alternatives

In education and instruction process, students might hesitate or be afraid of expressing their opinion in general platforms or due to the possibility of a negative response from the teacher when a question is asked (Lusk & Weinberg, 1994; Hwang et al., 2015). This leads to an intrinsic silence in the classroom and often to the decline of the motivation and interest in the class (Nguyen & Yukawa, 2019). Establishing environments where learners can express themselves comfortably would resolve this problem to some extent (Leithwood & Jantzi, 2000). The students' lack of participation in the class due to certain academic emotions would also affect their academic performances (Kibble, 2007). Toth, Logo and Logo (2019) used Kahoot! Application to improve students' learning, and it was observed that the students who used kahoot as a result of the study had better exam results. To encourage students to participate in classroom environment, to improve their motivation and interaction between students, applications such as Kahoot! could be utilized (Bicen & Kocakoyun, 2018; Chaiyo & Nokham, 2017; Hwang et al., 2015; Plump & LaRosa, 2017; Toth, Logo & Logo, 2019; Wang & Lieberoth, 2016; Yapici & Karakoyun, 2017). One of the most important steps in connecting learners to the courses is drawing attention (Driscoll, 2002). The fact that Kahoot! and similar SRS applications make the course entertaining, draw attention and develop critical thinking skills demonstrates the reasons behind their popularity (Chui et al., 2013; Dellos, 2015).

This study aimed to reveal the views and experiences about the use of Kahoot! application during a course given to prospective teachers in higher education. This is the first Kahoot! study that was used by information technology teacher candidates in the Database and Management Systems course. The Database and Management course requires some theoretical knowledge before practice. In this process, the motivation and attendance of students towards the lesson may decrease. Due to the students who had difficulty in database lessons and whose attendance was low, it was

decided to use an additional quiz application during the course and Kahoot! Web application was chosen.

Thus, the following research questions (RQ) were established in the present study:

RQ1. What are pre-service CEIT teachers' views towards in-classroom use of Kahoot! Application?

RQ 2. What are the learning environments and usage techniques that pre-service CEIT teachers would use the Kahoot! application in?

RQ 3. What are the recommendations of pre-service CEIT teachers for more active and productive use of Kahoot! Application in courses?

Method

The research model, data collection instruments, study group, data analysis, and the implementation process are discussed in this section.

Research Design

The present paper is based on a case study, a qualitative research method. Case study is a research method where one or more events, environments, social groups, the programs or interrelated systems are examined in detail in their natural framework (Flyvbjerg, 2006). Case studies are proposed to be used to assess learning-teaching processes, especially in educational research (Shulman, 1986). Case studies aim to investigate in-depth a phenomenon or event and are based on "how" and "what" questions (Yildirim & Simsek, 2013). In the present study, the case was determined as the use of the Kahoot application in database management systems course, and an attempt was made to examine in-depth and in detail what kind of experience the process would generate and what would be its effects.

Study Group

The study group included 45 students who attended the database management systems course at İnönü University, Faculty of Education, Computer and Instructional Technologies Department. The research sample consisted of 12 students randomly selected among 45 students. One of the researchers was the lecturer at the Database Management Systems course. Other researchers were academics working at İnönü and Gazi Universities.

Data Collection Instrument

The researchers investigated the relevant literature and used an open-ended interview form to obtain study data. During this process, the computer and Instructional Technologies academicians' opinions were obtained. The interview questions'

proficiency was determined, and several items were edited. After the literature review and expert opinions, the researchers prepared an open-ended interview form consisting of five questions. The five open-ended interview questions were confirmed by expert opinions that they were at a level to reveal the students' detailed opinions about the Kahoot! application used in the study. All the interviews were audiotaped with the consent of all participants. The researcher who was not a lecturer of the course conducted the interviews. Interviews lasted about 40 minutes. Participants were informed about the purpose of the study and detailed explanations confirmed that personal information would be kept confidential.

Implementation Tool: Kahoot!

Kahoot! is a student response system used to improve students' motivation and participation during the class and to review the class topics (Chaiyo & Nokham, 2017). Kahoot! was developed as a new generation web/mobile student response system. Users can access the system with a desktop or mobile system with an internet connection using a current web browser without a need for registration. In practice, registration is required only for educators who want to design questions for an education program or a different assessment test. Kahoot! application and other similar SRSs are well-designed and practical applications. Thus, educators can easily create online assessment tests (quizzes) within a few steps and present the students' related test (see Figure 3)



Figure 3. The Kahoot! application process

Students who want to participate in the educator's test enter the pin number of the particular test at Kahoot!.it and define a nickname and start to respond to the questions in the relevant test on the web simultaneously with other participants (see Figure 4 and 5). After each question is answered, the system displays the most rapid three students and related statistical data on the screen. After each question, the students who have the most total correct answers are ordered, and after the last test is completed, the top students are displayed on the screen. Participants can also view detailed statistical results based on the educator preferences.



Figure 4. Kahoot! Participant screen

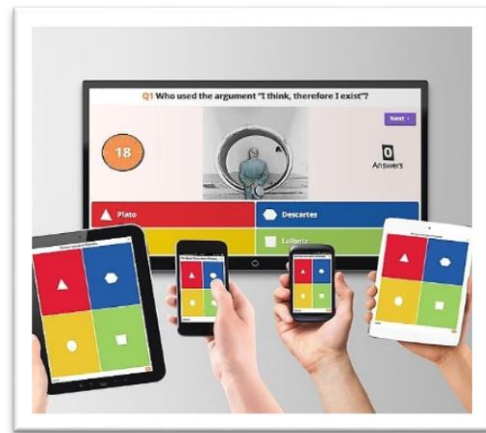


Figure 5. Kahoot! Response screen (play.kahoot.it)

Questions answered by the students are saved in the system at the end of the test. On the other hand, the ranking is displayed on the screen after each question, and finally at the end of the quiz the general ranking is displayed. After each question is answered, a feedback on the question is provided for the students (see Figure 6 and 7).

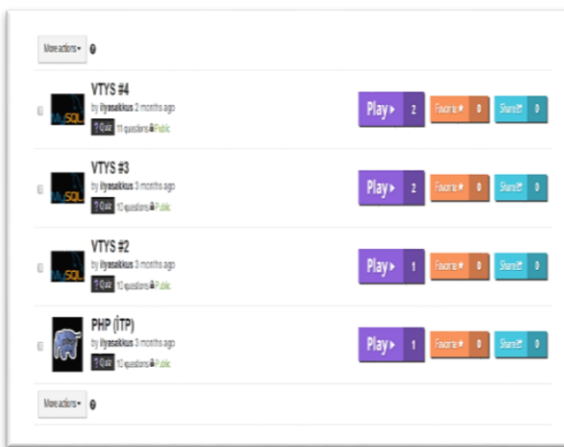


Figure 6. Tests designed for 4 weeks in the study

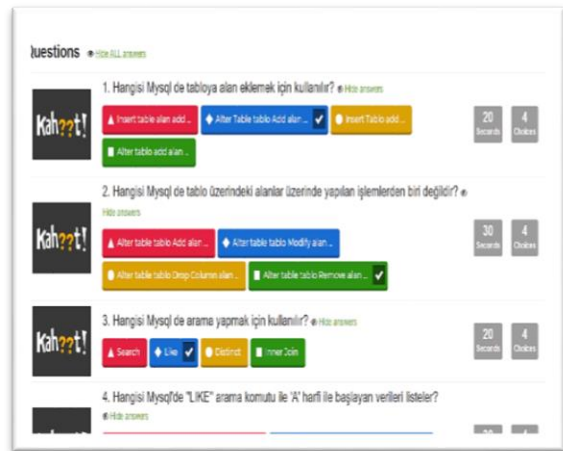


Figure 7. Kahoot application sample

The detailed report for the participating students and the statistical data on the responses are shown as presented above (see Figure 7).

The questions (quiz) determined by the educator were listed separately for each week, and a different pin number was required for access to the test every week. A sample question in the Kahoot! application used in the present study was displayed on the screen to the students as shown below. Students answered the question displayed on



the screen by selecting the color of their selection on their device (see Figure 8).

Figure 8. Simple question outcomes of this implementation

Data Analysis

Data analysis was conducted with content analysis. Content analysis entails the conversion and categorization of complex data to obtain meaningful data via analysis (Yildirim & Simsek, 2013). The general aim of content analysis is to achieve concepts, relational structures, and the concealed facts within the data (Creswell, 2007). First of all, the interview records were reviewed and transcribed. After the study, data were transcribed, reviewed, and coded by different researchers by Nvivo Caqdas Software. The researchers repeatedly checked the interview records to avoid data loss or destruction for each question. The researcher who was the instructor of the course and the researcher who conducted the interviews coded the data. Furthermore, the two researchers examined the coding and attempted to achieve consistency by eliminating the differences. Following the coding process, two authors discussed about the codes, and common features among the codes were determined and categorized. After coding interview data, findings were analyzed under three research problems.

Validity and Reliability

Interview questions were examined by three different field experts and were reorganized accordingly. A pilot scheme was conducted before the data were collected,

and the interview questions were reviewed and edited for clarity and comprehensibility. The study data were collected from volunteering participants. In order to improve the validity and reliability of the study, all interviews were recorded with an audio recorder. Coding was conducted by the two researchers separately. The differences were resolved through discussions, and a consensus was reached about the differences to establish consistency. To improve the reliability of the study, the participant statements were directly cited in the manuscript. The coherence between the categories and codes was established.

Research Process

This study was conducted in four weeks, and the student feedback was obtained at the end of the class with Kahoot! every week (see Figure 9).

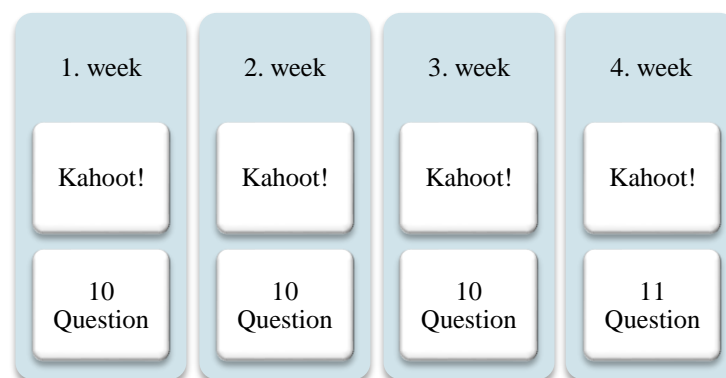


Figure 9. Research process

The study was conducted in the Database Management Systems course, and 45 students participated in the study. In the first class, Kahoot! application was briefly introduced and 10 pre-prepared multiple-choice questions about the week's topic were shown to the students. At the end of the four weeks, the students' views were obtained with the open-ended interview form that the two authors designed and validated and evaluated by two faculty member field experts. Five questions were shown to the students. Obtained interview data were supported by researcher observations and diaries.

Findings

In this section, the themes, code tables, and findings obtained with content analysis conducted on the study data are interpreted.

RQ1. The Views of Pre-service CEIT Teachers on the Use of Kahoot! Application in the Course

In the study, the pre-service students were asked to communicate their views on the use of Kahoot! application in the course. The opinions obtained were analyzed and the resulting themes were interpreted in two separate tables of *positive and negative views*. Content analysis conducted on the obtained views revealed $n = 12$ codes under this question (see Table 1).

Table 1.

The Codes that Included the Positive Views Theme of Pre-Service Teachers on Kahoot! Application

Codes	f	%
Entertaining	9	14.29%
Review	9	14.29%
Drawing attention	7	11.11%
Motivating	7	11.11%
Reinforcement	7	11.11%
Promoting participation	6	9.52%
Readiness	5	7.94%
Competition	3	4.76%
Gamification	3	4.76%
Feedback	3	4.76%
Concretization	2	3.17%
In-class interaction	2	3.17%

The analysis of pre-service teachers' positive responses in the study on the Kahoot! application and the codes that could be considered as the advantages of the application demonstrated that they mostly found the application entertaining ($n = 9$). Regarding this, one participant said *"It makes the lesson more enjoyable and it is an important tool to keep the lesson not boring. I would like it to be used in every lesson."* And the another most prominent code within the said main theme was the review of the learned topics ($n = 9$). In the course, the other significant codes were the reinforcement of the course ($n = 7$), encouragement of promoting participation ($n = 6$) and motivation ($n = 7$). In the analysis, a participant about the reinforcement code that was among the positive contributions to the lesson said *"We reinforced what we learned in the lesson by solving the questions in these quizzes and it made what we learned permanent."*

On the other hand, about motivation code, a participant stated the following: "I believe that it contributes to our learning, and it allows us to remember and review the knowledge, increasing our motivation for the course in a competitive environment." On the students' readiness before class ($n = 5$) and the increase in in-class interaction ($n = 2$) because of the Kahoot! application, a participant stated the following: "I now attend classes prepared after the implementation. Because it increases competitiveness among the classmates and everyone tries to answer more questions correctly, which makes the course more active and it becomes fun."

Furthermore, in the study where it was deduced that use of the Kahoot! application in the course drawing attention ($n = 7$) and provided gamification ($n = 3$), a student stated "The course became more fun with Kahoot! application. I never wanted to attend the course before, but now the course is more attractive for me", demonstrating that the course also had a motivating aspect ($n = 1$). Another participant supported the attention-grabbing and entertaining element of the application: "It was fun for me. Also, it became more fun with my classmates. The course grabbed my attention better." Regarding the feedback ($n = 3$), a participant said, "It was sometimes difficult to get feedback about any concept or topic we did not understand in the lesson, but the feedback was also provided in this Kahoot! practice."

In the second table, $n = 3$ codes emerged with the negative views theme on the use of Kahoot! application in the course (see Table 2).

Table 2.

The Codes that Included the Theme of the Negative View of Pre-service Teachers on Kahoot! Application

Codes	f	%
Stealing the course time	4	44.44
Loudly stating the answers	3	33.33
Failing students are offended	2	22.22

Table 2 shows that pre-service teachers considered that Kahoot! application stole the time assigned for the course ($n = 4$). On this issue, a participant stated "The application was beneficial, but I think it takes too much time, and some friends loudly gave the right answer, so they affected the answers of others." One participant said, "When the questions appear in the application, some friends say the answers out loud, so they affect the results." Another complaint was that the correct answers of the questions were voiced loudly by other students in the classroom ($n = 3$) and the students who did not know the correct answer were offended ($n = 2$).

Rq2. Learning Environments and Usage Techniques that CEIT Pre-service Teachers Could Utilize the Kahoot! Application

The pre-service teachers were asked about their views on the learning environments where they could use the Kahoot! application and the techniques that they can utilize while implementing the Kahoot! application. Content analysis conducted on the obtained views revealed $n= 3$ main codes and $n= 6$ sub-codes under the main codes (see Table 3).

Table 3.

The Codes on the Views of Pre-service Teachers on Learning Environments Theme Where They Could Use the Kahoot! Application and Usage Techniques

Main Codes	Sub-codes	f	%
Timing	At the end of the class	6	27.27
	At the beginning of the class	3	13.64
Learning environment	Theoretical courses	4	18.18
	Applied courses	2	9.09
Method	Quiz method	4	18.18
	Gamification method	3	13.64

When the pre-service teachers were asked in which learning environments, under which timings and with which techniques they would use the Kahoot! application, it was determined that most wanted to use the application at the end of the class ($n= 6$), while others preferred to use it at the beginning of the course ($n= 3$). A participant on this subject said *"If we use this application at the end of the lesson, we will repeat and reinforce all the topics we taught that day."* On the learning environment, pre-service teachers claimed that Kahoot! application was more suitable in theoretical courses ($n= 4$) when compared to applied courses ($n= 2$). Participants stated that they could use the application with the courses' quiz and gamification techniques: *"I would like the application to be used more in the theoretical courses that are learned by rote. I would ask them easy and difficult questions at the end of the class after the instruction to see whether they have comprehended the topic. Thus, I would provide them with a fun environment, while allowing them to review the topic."* Another participant stated the following: *"I would prefer the use of the Kahoot! application in applied courses. Before the class, I would prepare questions to review the previous week's topics. Thus, the students would learn while having fun and they would be able to review the topic."*

RQ3. Recommendations of CEIT Pre-service Teachers for more Active and Productive Use of Kahoot! Application in Courses

Pre-service teachers were asked to offer recommendations for more active and productive use of the Kahoot! application in courses. As a result of content analysis of the participant recommendations, $n= 4$ codes emerged (see Table 4).

Table 4.

The Codes that Reflect the Recommendations Theme of Pre-Service Teachers for More Active and Productive Use of the Kahoot! Application in Courses

Codes	f	%
More time should be allotted	9	52.94
Questions that include audiovisual elements should be included	3	17.65
Rewards should be awarded	2	11.76%
Number of questions should be increased	2	11.76%

On more active and productive use of Kahoot! application, pre-service teachers recommended to allot more time for each question since the time allowed was not sufficient (n= 9). One participant on this topic said, *"The questions are very instructive and the exercise is fun, but a little more time should be given for each question."* Furthermore, they stated that the questions should contain audiovisual elements (n= 3) and the users should be rewarded at the end of the application (n= 2). Another participant commented as follows: *"The students should be rewarded based on the results, the number of questions should be comprehensive based on the course the students attend."* One participant stated the following on the topic: *"I would like to use the Kahoot! application in every course. Of course, the number of questions should be higher, and it would be better to use more visual materials when asking questions."* In addition to this comments a participant said, *"I learn better subjects using Kahoot and I think it should be used especially in verbal-based lessons."* Increasing the number of questions in the application (n= 2) was among the other prominent codes.

Discussion

There are certain consequences of the use of SRSs in education. Perhaps, one of the most important consequences of SRS use, which is used by both the instructor and the student and becomes popular every day, is the promotion of active learning (Bawa, 2019; Bicen & Karakoyun, 2018; Licorish, Owen, Daniel & George, 2018; Martyn, 2007; O'Donoghue & O'Steen, 2007). One of these SRS systems that allows students to bond with the course via entertaining activities and make sense of the learning is Kahoot! application (Cameron & Bizo, 2019; Chaiyo & Nokham, 2017; Dellos, 2015; Plump & LaRosa, 2017; Uçar & Kumtepe, 2017; Wang & Lieberoth, 2016). In a study conducted on the topic, Wang and Lieberoth (2016) stated that SRSs are used in courses with gamification methods and achieved student participation and motivation using audiovisual material, animations, etc. Also, in the present study, it was observed that students who stated their views on Kahoot! application usually exhibited positive views. Participants who stated that Kahoot! application was entertaining and drawing attention expressed their satisfaction with the application. Bawa (2019) stated that Kahoot! application increases learning performance of university students and

contributes to active learning. Previous studies reported that most web-based SRSs are game-based learning tools and Kahoot! Application was one of these (Chaiyo & Nokham, 2017; Dellos, 2015). Some participants indicated that Kahoot! application was a feedback tool. Previous studies also reported that Kahoot! and similar SRS applications are effective feedback tools (Egelandstal & Krumsvik, 2017; Hwang et al., 2015; Licorish et al., 2018; Plump & LaRosa, 2017). Wichadee and Pattanapichet (2018) stated that providing instant feedback greatly affects students' motivation and Kahoot allows all students to participate and get feedback at once. In this study, one of the participants' featured views about Kahoot application is the positive contribution to concentration. Chaiyo and Nokham (2017) stated in their experimental study on student response systems' effect on students' perceptions that the Kahoot! application has positive contributions to concentration. Cameron and Bizo (2018) used game based Kahoot! application to facilitate learning engagement in animal science students. As a result of the study, they stated that Kahoot! did not increase the engagement or achievement of the students, but students considered the application as a fun social activity at the end of the lesson.

In educational environments, several printed and digital materials are used in the classroom and it is known that these materials contribute to learning and teaching activities at different levels (Wei & Hindman, 2011). Present study findings demonstrated that the most significant contributions of the Kahoot! application to the course were the promotion of participation in the course, reinforcement, instill competition, provoke challenge, and review of learning. The fact that it provided motivation and concretization demonstrated the application's positive features. Ucar and Kumtepe (2017), who conducted a study on the use of Kahoot! application in the classroom, stated that Kahoot! application engages the students to the course and motivates them, and their observations reflected that the students liked the application extensively. The fact that SRS applications such as Kahoot! are game-based applications that could draw the attention to the course motivates the students and promotes participation (Ganapathy & Kaur, 2018; Siegle, 2015; Tan Ai Lin, Wang, 2015).

Participants, when asked about their negative views on Kahoot! application, stated that it takes too much time when used in classroom environment and some students voiced their answers loudly when answering the questions on the application. Licorish et al., (2018) found some problems on their Kahoot study. First of all, they stated that teachers could reduce Kahoot sessions' length and devote more time to the post-Kahoot discussion of the answers. And also teachers might support students when they used the Kahoot application. So they could utilize the effectiveness of Kahoot. Besides, some students mentioned technical problems including unreliable internet connections, hardship of reading questions and answering on a projected screen, not being able to change answer after submission, stressful time-pressure for giving answers, not enough time to answer, fear of losing, and difficulty in catching up if an incorrect answer had been given (Nguyen & Yukawa, 2019; Wang & Tahir, 2020).

Concerning the views on usage of Kahoot! application, it was stated that it should be applied at the end of the class, in theoretical courses, and with multiple choice questions. Dellos (2015), who used Kahoot! to reinforce learning and provide feedback at the end of the class, stated that students comprehended the missing points and concepts better and the application improved classroom participation. In a thesis by Ciaramella (2017), Kahoot! application was used for vocabulary learning and memorization of elementary school students with learning disabilities, and it was stated that the vocabulary learning, and memorability improved at the end of the study (Ciaramella, 2017). In an empirical study, Edison and Hurtado (2017) used the Kahoot! application for English vocabulary learning and stated that the motivation and achievement of the students in the course increased as a result of the study (Medina & Hurtado, 2017).

The students' recommendations for more active and productive use of the Kahoot! application included the increase of the time allotted for the application and the utilization of audiovisual material in the present study. Furthermore, the students also proposed the use of rewards, increasing the number of questions and utilization of the application in theoretical courses.

Limitations and Suggestions for Further Research

Although a positive result has been achieved as a result of this study, it is wondered what kind of effects might be possible with different research methods and SRS applications in different fields. In this study, it is a limitation that the group used as the sample was not selected by the random method and selected by the purposeful sampling method. However, it is possible to include studies in which samples are generated by random assignment method using experimental designs. Since the research a case study, 45 people in a selected section have been identified as a sample in a four-week study period. A semi-structured interview form prepared as a measurement tool was used and investigator observations supported data.

Another limitation was the use of the Kahoot! application in student response systems. The use of the Kahoot application is high in availability and usability, while many SRS applications are web-based and running on different devices. The fact that the study was conducted on only one class and on a sample made it difficult to estimate the validity of the data. However, the consequences of such case studies are mainly due to the fact that they are welding quality.

In the present study that investigated online SRS systems and the Kahoot! application, which is one of these SRS applications, it is proposed to utilize the application in other departments in the field of education. The comprehensive effectiveness of SRS systems could be determined in future studies that would compare other web-based SRS applications with Kahoot! and conduct content analyses. Furthermore, it is considered that higher education level samples should be selected in addition to the K-12 level in future implementations.

Conclusion

In summary, this study, which utilized a case study design of qualitative research methods, implemented Kahoot! application in a lesson environment where a class of 45 people was present and its reflections on students were revealed. The data were collected from 12 students selected from this group. The results of the four week period in this study using the Kahoot! application as one of the game-based online student response systems were positive from the participants' perspective. The Kahoot! application has been one of the most prominent views that encourage student engagement in the classroom, promote motivation, reinforcement, and repetition. Previous studies have supported the result of this study, in which student response systems increase class participation and motivation in the classrooms they are used. In particular, web-based and mobile-supported Kahoot! and similar SRS applications in learning environments are expected to contribute positively in the same way with the spread of studies in different dimensions.

Acknowledgments

This study is an expanded version of the oral presentation at the 11th International Computer and Instructional Technologies Symposium.

References

- Armbruster, P., Patel, M., Johnson, E., & Weiss, M. (2009). Active learning and student-centered pedagogy improve student attitudes and performance in introductory biology. *CBE—Life Sciences Education*, 8(3), 203-213. <https://doi.org/10.1187/cbe.09-03-0025>
- Bawa, P. (2019). Using kahoot to inspire. *Journal of Educational Technology Systems*, 47(3), 373-390. <https://doi.org/10.1177%2F0047239518804173>
- Beatty, I. D., Gerace, W. J., Leonard, W. J., & Dufresne, R. J. (2006). Designing effective questions for classroom response system teaching. *American journal of Physics*, 74(1), 31-39. <https://doi.org/10.1119/1.2121753>
- Bicen, H., & Kocakoyun, S. (2018). Perceptions of students for gamification approach: Kahoot as a case study. *International Journal of Emerging Technologies in Learning (IJET)*, 13(02), 72-93. <https://doi.org/10.3991/ijet.v13i02.7467>
- Blood, E., & Neel, R. (2008). Using student response systems in lecture-based instruction: Does it change student engagement and learning? *Journal of Technology and Teacher Education*, 16(3), 375. <https://www.learntechlib.org/primary/p/24340/>.
- Çağıltay, K., Yıldırım, S., Aslan, İ., Gök, A., Gürel, G., Karakuş, T., & Yıldız, İ. (2007). Öğretim teknolojilerinin üniversitede kullanımına yönelik alışkanlıklar ve beklentiler: Betimleyici bir çalışma. *Akademik Bilişim*.
- Cain, J., Black, E. P., & Rohr, J. (2009). An audience response system strategy to improve student motivation, attention, and feedback. *American journal of pharmaceutical education*, 73(2), 21. <https://dx.doi.org/10.5688%2Faj730221>
- Cameron, KE., & Bizo, LA. (2019). Use of the game-based learning platform KAHOOT! to facilitate learner engagement in Animal Science students. *Research in Learning Technology*, 27, 1-14. <https://doi.org/10.25304/rlt.v27.2225>
- Carnaghan, C., Edmonds, T. P., Lechner, T. A., & Olds, P. R. (2011). Using student response systems in the accounting classroom: Strengths, strategies and limitations. *Journal of Accounting Education*, 29(4), 265-283. <https://doi.org/10.1016/j.jaccedu.2012.05.002>
- Carnaghan, C., & Webb, A. (2007). Investigating the effects of group response systems on student satisfaction, learning, and engagement in accounting education. *Issues in Accounting Education*, 22(3), 391-409. <https://doi.org/10.2308/iace.2007.22.3.391>
- Chaiyo, Y., & Nokham, R. (2017). *The effect of Kahoot, Quizizz and Google Forms on the student's perception in the classrooms response system*. Paper presented at the Digital Arts, Media and Technology (ICDAMT), International Conference on.
- Chui, L., Martin, K., & Pike, B. (2013). A quasi-experimental assessment of interactive student response systems on student confidence, effort, and course performance. *Journal of Accounting Education*, 31(1), 17-30. <https://doi.org/10.1016/j.jaccedu.2013.01.002>
- Ciamarella, K. E. (2017). *The effects of Kahoot! on vocabulary acquisition and retention of students with learning disabilities and other health impairments*. (Doctoral dissertation, Rowan University).
- Clark, R. C., & Mayer, R. E. (2016). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning*. John Wiley & Sons.
- Creswell, J. W. (2007). *Qualitative enquiry and research design: Choosing among five approaches*. Sage Publications.
- Çubukçu, Z. (2012). Teachers' evaluation of student-centered learning environments. *Education*, 133(1), 49-66.
- Dellos, R. (2015). Kahoot! A digital game resource for learning. *International Journal of Instructional Technology and Distance Learning*, 12(4), 49-52. <https://doi.org/10.1.1.694.5955>
- Deslauriers, L., Schelew, E., & Wieman, C. (2011). Improved learning in a large-enrollment physics class. *Science*, 332(6031), 862-864. <https://doi.org/10.1126/science.1201783>
- Driscoll, M. P. (2002). *How People Learn (and What Technology Might Have To Do with It)*. Syracuse, ERIC Clearinghouse on Information and Technology. (ERIC Document Reproduction Service No. ED 470032), 2002.

- Egelandstal, K., & Krumsvik, R. J. (2017). Clickers and formative feedback at university lectures. *Education and Information Technologies*, 22(1), 55-74. <https://doi.org/10.1007/s10639-015-9437-x>
- Ertmer, P. A., & Ottenbreit-Leftwich, A. (2013). Removing obstacles to the pedagogical changes required by Jonassen's vision of authentic technology-enabled learning. *Computers & Education*, 64, 175-182. <https://doi.org/10.1016/j.compedu.2012.10.008>
- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative inquiry*, 12(2), 219-245. <https://doi.org/10.1177%2F1077800405284363>
- Galal, S. M., Mayberry, J. K., Chan, E., Hargis, J., & Halilovic, J. (2015). Technology vs. pedagogy: Instructional effectiveness and student perceptions of a student response system. *Currents in Pharmacy Teaching and Learning*, 7(5), 590-598. <http://dx.doi.org/10.1016%2Fj.cptl.2015.06.004>
- Gauci, S. A., Dantas, A. M., Williams, D. A., & Kemm, R. E. (2009). Promoting student-centered active learning in lectures with a personal response system. *Advances in Physiology Education*, 33(1), 60-71. doi: 10.1152/advan.00109.2007.
- Gok, T. (2011). An evaluation of student response systems from the viewpoint of instructors and students. *TOJET: The Turkish Online Journal of Educational Technology*, 10(4), 67-83.
- Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American journal of Physics*, 66(1), 64-74. <https://dx.doi.org/10.1119/1.18809>
- Hall, R. H., Collier, H. L., Thomas, M. L., & Hilgers, M. G. (2005). A student response system for increasing engagement, motivation, and learning in high enrollment lectures. *AMCIS 2005 Proceedings*, 255.
- Heaslip, G., Donovan, P., & Cullen, J. G. (2014). Student response systems and learner engagement in large classes. *Active Learning in Higher Education*, 15(1), 11-24. <https://doi.org/10.1177%2F1469787413514648>
- Hwang, I., Wong, K., Lam, S. L., & Lam, P. (2015). Student Response (Clicker) Systems: Preferences of Biomedical Physiology Students in Asian Classes. *Electronic Journal of e-learning*, 13(5), 319-330. <https://files.eric.ed.gov/fulltext/EJ1084217.pdf>
- Icard, B. (2014). Educational technology best practices. *International Journal of Instructional Technology and Distance Learning*, 11(3), 37-41.
- Kaiser, C. M., & Wisniewski, M. A. (2012). Enhancing Student Learning and Engagement Using Student Response Systems. *Social Studies Research & Practice*, 7(3). <https://doi.org/10.1177/1469787413514648>
- Keser, Ö. F. (2005). Recommendations towards developing educational standards to improve science education in Turkey. *TOJET: The Turkish Online Journal of Educational Technology*, 4(1).
- Kibble, J. (2007). Use of unsupervised online quizzes as formative assessment in a medical physiology course: effects of incentives on student participation and performance. *Advances in Physiology Education*, 31(3), 253-260. <https://doi.org/10.1152/advan.00027.2007>
- Korkut, E., & Akkoyunlu, B. (2008). Yabancı dil öğretmen adaylarının bilgi ve bilgisayar okuryazarlık öz-yeterlikleri. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 34(34). <https://dergipark.org.tr/tr/pub/hunefd/issue/7802/102256>
- Leithwood, K., & Jantzi, D. (2000). The effects of transformational leadership on organizational conditions and student engagement with school. *Journal of Educational Administration*, 38(2), 112-129. <https://doi.org/10.1108/09578230010320064>
- Licorish, S. A., Owen, H. E., Daniel, B., & George, J. L. (2018). Students' perception of Kahoot!'s influence on teaching and learning. *Research and Practice in Technology Enhanced Learning*, 13(1), 9. <https://doi.org/10.1186/s41039-018-0078-8>
- Lusk, A. B., & Weinberg, A. S. (1994). Discussing controversial topics in the classroom: Creating a context for learning. *Teaching Sociology*, 301-308. <https://doi.org/10.2307/1318922>
- Martyn, M. (2007). Clickers in the classroom: An active learning approach. *Educause quarterly*, 30(2), 71.
- Medina, E. G. L., & Hurtado, C. P. R. (2017). Kahoot! A Digital Tool for Learning Vocabulary in a language classroom. *Revista Publicando*, 4(12 (1)), 441-449.

- Meyers, C., & Jones, T. B. (1993). *Promoting Active Learning. Strategies for the College Classroom*: ERIC.
- Nguyen, T. T. T., & Yukawa, T. (2019). Kahoot with smartphones in testing and assessment of language teaching and learning, the need of training on mobile devices for Vietnamese teachers and students. *International Journal of Information and Education Technology*, 9(4), 286-296. <https://doi.org/10.18178/ijiet.2019.9.4.1214>
- O'Donoghue, M., & O'Steen, B. (2007). Clicking on or off? Lecturers' rationale for using student response systems. *Proceedings ascilite Singapore*.
- Penuel, W. R., Boscardin, C. K., Masyn, K., & Crawford, V. M. (2007). Teaching with student response systems in elementary and secondary education settings: A survey study. *Educational Technology Research and Development*, 55(4), 315-346.
- Plump, C. M., & LaRosa, J. (2017). Using Kahoot! in the Classroom to Create Engagement and Active Learning: A Game-Based Technology Solution for eLearning Novices. *Management Teaching Review*, 2(2), 151-158. <https://doi.org/10.1177%2F2379298116689783>
- Seferoğlu, S. S. (2006). *Öğretim teknolojileri ve materyal tasarımı*. Pegem A Yayıncılık.
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational researcher*, 15(2), 4-14.
- Siegle, D. (2015). Technology: Learning can be fun and games. *Gifted Child Today*, 38(3), 192-197. <https://doi.org/10.1177%2F1076217515583744>
- Stav, J., Nielsen, K., Hansen-Nygaard, G., & Thorseth, T. (2010). Experiences obtained with integration of student response systems for iPod Touch and iPhone into e-learning environments. *Electronic Journal of e-learning*, 8(2), 179-190.
- Sun, J. C.-Y. (2014). Influence of polling technologies on student engagement: An analysis of student motivation, academic performance, and brainwave data. *Computers & Education*, 72, 80-89. <https://doi.org/10.1016/j.compedu.2013.10.010>
- Tan Ai Lin, D., Ganapathy, M., & Kaur, M. (2018). Kahoot! It: Gamification in Higher Education. *Pertanika Journal of Social Sciences & Humanities*, 26(1).
- Tóth, Á., Lógó, P., & Lógó, E. (2019). The Effect of the Kahoot Quiz on the Student's Results in the Exam. *Periodica Polytechnica Social and Management Sciences*, 27(2), 173-179. <https://doi.org/10.3311/PPso.12464>
- Trees, A. R., & Jackson, M. H. (2007). The learning environment in clicker classrooms: student processes of learning and involvement in large university-level courses using student response systems. *Learning, Media and Technology*, 32(1), 21-40. <https://doi.org/10.1080/17439880601141179>
- Uçar, H., & Kumtepe, A. T. (2017). *Using the Game-based Student Response Tool Kahoot! in an Online Class: Perspectives of Online Learners*. Paper presented at the Society for Information Technology & Teacher Education International Conference.
- Wang, A. I. (2015). The wear out effect of a game-based student response system. *Computers & Education*, 82, 217-227. <https://doi.org/10.1016/j.compedu.2014.11.004>
- Wang, A. I., & Lieberoth, A. (2016). *The effect of points and audio on concentration, engagement, enjoyment, learning, motivation, and classroom dynamics using Kahoot!* Paper presented at the European Conference on Games Based Learning.
- Wang, A. I., & Tahir, R. (2020). The effect of using Kahoot! for learning—A literature review. *Computers & Education*, 149, 103818. <https://doi.org/10.1016/j.compedu.2020.103818>
- Wang, A. I., Zhu, M., & Sætre, R. (2016). *The effect of digitizing and gamifying quizzing in classrooms*. Academic Conferences and Publishing International.
- Wei, L., & Hindman, D. B. (2011). Does the digital divide matter more? Comparing the effects of new media and old media use on the education-based knowledge gap. *Mass Communication and Society*, 14(2), 216-235. <https://doi.org/10.1080/15205431003642707>
- 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.
- Wieman, C. (2007). Why not try a scientific approach to science education? *Change: The Magazine of Higher Learning*, 39(5), 9-15. <https://doi.org/10.3200/CHNG.39.5.9-15>
- Yapıcı, İ. Ü., & Karakoyun, F. (2017). Biyoloji Öğretiminde Oyunlaştırma: Kahoot Uygulaması Örneği. *Turkish Online Journal of Qualitative Inquiry*, 8(4), 396-414.

Yıldırım, A., & Şimşek, H. (2013). *Sosyal bilimlerde nitel araştırma yöntemleri* [Qualitative research methods in social sciences] (9. Genişletilmiş Baskı). Seçkin Yayınevi.

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