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# Kahoot, A New and Cheap Way to Get Classroom-Response Instead of Using Clickers

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## ABSTRACT

This evidence based practice paper describes a study about an immediate feedback system using Internet and students' own cell phones: Kahoot (getkahoot.com), also a comparison between implementing clickers and mobile participation systems is analyzed. Immediate feedback enhances students' learning. For students, it's a chance to go further by breaking misconceptions and changing learning routes. For teachers, it's a practical opportunity to feel the "temperature" of the classroom in order to decide to either review some concepts or move forward to another subject. There are many cases in literature about the use of clickers as an immediate feedback system. The clicker itself is neither a tool to directly teach concepts, nor it is meant to replace quality lesson preparation and planning. The clicker is a powerful tool to augment and enhance active learning in classroom, and most importantly, it is a mean to provide accurate situational awareness to the instructor. However, implementing this solution is usually expensive, since it costs about US$ 50 each one. Kahoot is an online classroom-response system that eliminates the need to give students handheld clickers. Through Kahoot, teachers create online quizzes or surveys and mirror the questions on a big screen or interactive whiteboard; it's also possible to embed videos. Students respond to the quiz items on any Internet-connected device, including their smartphones. During this session, participants take Kahoot quizzes as students. Participants may also create Kahoot quizzes as teachers, share their quizzes with other participants, and analyze quizzes results. It's worth to mention that the result of every quiz played over the platform can be saved for further analysis. When learners start playing, they need to enter a nickname, which allows students to stay anonymous, and their recorded scores are saved in their profile. This unique feature makes Kahoot an engaging platform. In order to present students and teachers perception about this new methodology, Kahoot system is presented in five different approaches: Introduction of a new concept or topic; Reinforcement of knowledge; Encouragement of reflection and peer-led discussion; Connection of classrooms and Challenge for learners to make their own Kahoot quizzes. Some of these purposes presented were studied in Physics I and Chemistry courses for freshman students and Physics II course for sophomore students in an Engineering School.

## Introduction

Immediate feedback enhances students' learning. For students, it's a chance to go further by breaking misconceptions and changing learning routes. For teachers, it's a practical opportunity to feel the "temperature" of the classroom in order to decide to either review some concepts or move forward to another subject. There are many cases in literature about the use of clickers as an immediate feedback system[1,2,3,4,5,6,7,8]. According to some authors[4,5], the clicker itself is neither a tool to directly teach concepts, nor it is meant to replace quality lesson preparation and planning. The clicker is a powerful tool to augment and enhance active learning in classroom, and most importantly, it is a mean to provide accurate situational awareness to the instructor. However, implementing this solution is usually expensive, since it costs about US$ 50 each one[9]. This paper presents a study about an immediate feedback system using Internet and students' own cell phones: Kahoot (getkahoot.com). Kahoot is an online classroom-response system that eliminates the need to give students handheld clickers. Through Kahoot, teachers create online quizzes or surveys and mirror the questions on a big screen or interactive whiteboard; it's also possible to embed videos.

## How Kahoot works

It's very easy to create questions in Kahoot platform (Fig.1). Firstly, it's necessary to get a free account (Fig.1 - step 1). Then, after being logged in, it's possible to create questions and answers (Fig.1 - steps 2 and 3). After that, it is necessary to get the questionaries' a name (Fig.1 - step 4) and also, it's possible to add a cover image to the quiz (Fig.1 - step 5). In order to allow students to play (Fig.2 – step 1), the teacher needs to log into Kahoot, select a questionnaire and launch (Fig.2 - step 2). The teacher should then share the pin created so each student can access the link kahoot.it and enter the pin number (Fig.2 - step 3). After that, each player must get a nickname, which allows students to stay anonymous, and play. For each question answered (Fig.2 - step 4), the system reports an immediate feedback (Fig.2 - step 5). Between one question and another, the teacher can take any time wanted to discuss the answer with the students and to encourage peer instruction. Students are ranked based on their scores and after each question, a current ranking is shown (Fig.2 - step 6). At the end, after all questions were answered, the "winner" is known (Fig.2 - step 7). After playing the game, students can rate the experience (Fig.2 - step 8) and the detailed results can be saved for future analysis (Fig.2 - step 9). It's worth to mention that any questionnaire created can easily be shared with other users in Kahoot community.

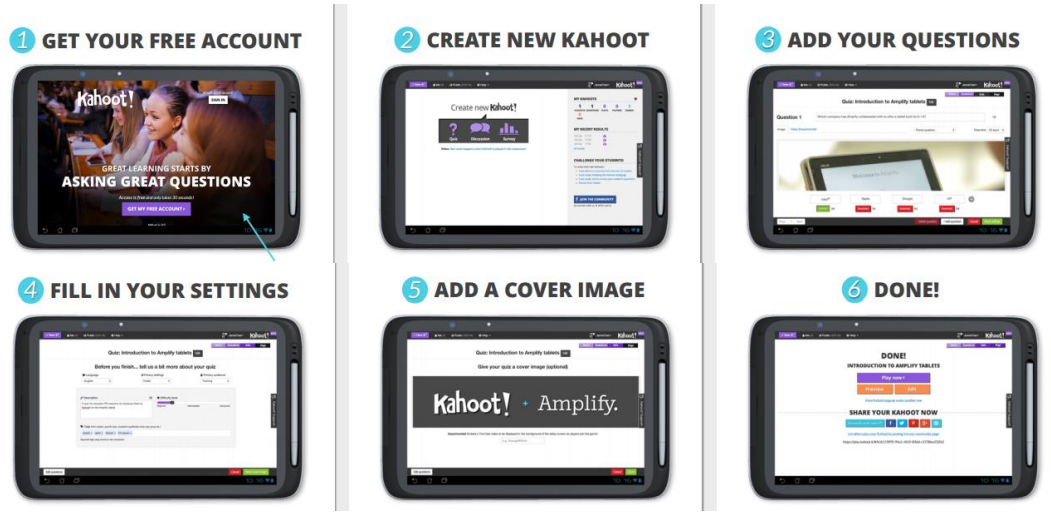


Fig.1 - Creating questions in Kahoot[10]

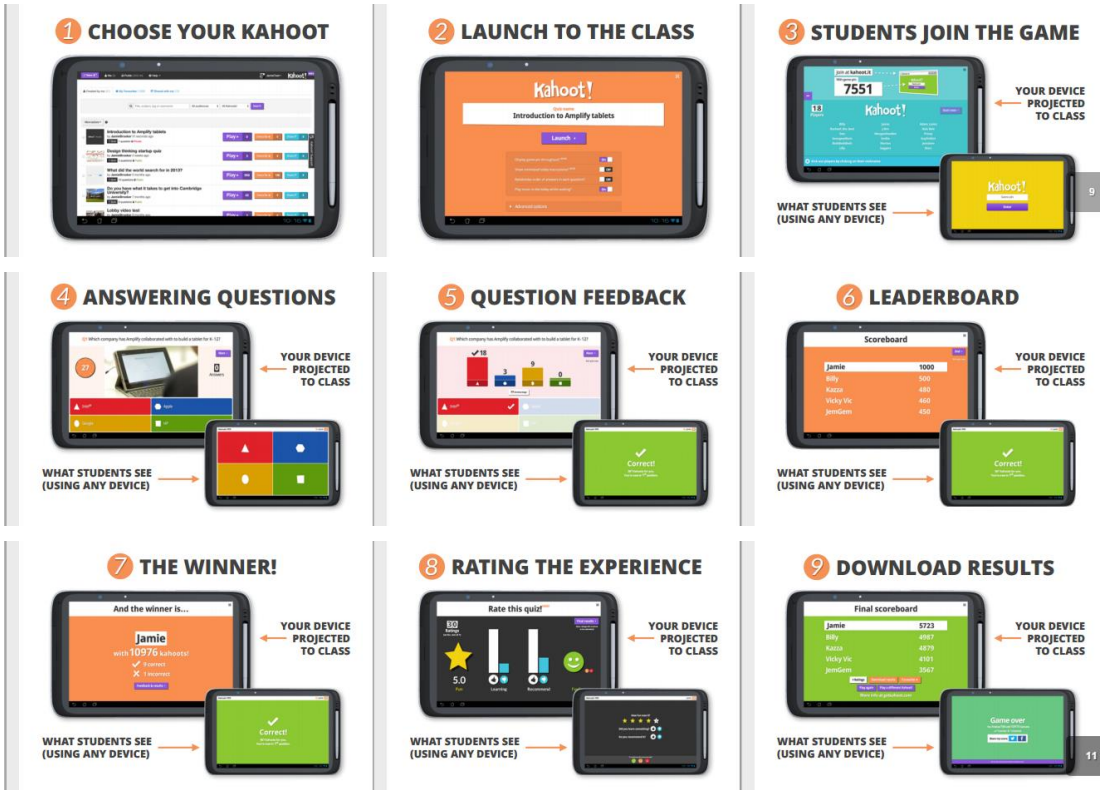


Fig.2 - Playing in Kahoot[10]

Each question and alternative answer has a 95 character limit, being only four alternatives allowed. In each question, it's possible to embed images and YouTube videos. Time limit for answering each question can be chosen from 5 to120 seconds.

Comparison between implementing clickers and mobile participation systems

Although clickers[11] have been known and widely used by the academic community in the past years, the use of mobile systems[12] has been lately increasing. Table 1, adapted from the table "Benefits of Clickers"[3], presents some benefits of Immediate Feedback Response Systems. In practice, using Kahoot or any other mobile participation

system[13,14,15,16] leads to the same benefits listed on Table 1. However, there are a few differences between implementing clickers and mobile participation systems, as presented in Table 2. One main difference is that the use of clickers requires the acquisition of an individual device for each student, while the use of mobile systems needs more Internet structure.

Table 1: Benefits of Immediate Feedback Response Systems

| | | |
|---|---|---|
| Classroom | Attendance | Students go more to class |
| | Attention | Students are more focused |
| | Anonymity | All students participate anonymously |
| | Participation | Students connect more with peers to solve problems |
| | Engagement | Students are more engaged |
| Learning | Interaction | Students interact more with peers to discuss ideas |
| | Discussion | Students actively discuss misconceptions to build knowledge |
| | Contingent teaching | Instruction can be modified from students feedback |
| | Learning performance | Improvement of learning performance |
| | Quality of learning | Qualitative difference when learning with Immediate Feedback Response Systems |
| Assessment | Feedback | Students and teacher like getting regular feedback on understanding |
| | Formative | The assessment improves students understanding and quality of teaching |
| | Comparison | Students compare their response to class response |
| Teachers | Engagement | Teachers are more engaged |
| | Sharing knowledge | Teachers can share their Kahoot quizzes all over the world |
| | Promote online competitions | Teachers can promote online competitions among their students or any community |
| | Social media sharing | Sharing results in social media brings publicity of schools and subjects |

Table 2: Differences between implementing clickers and Kahoot

| | Clickers | Kahoot |
|---|---|---|
| Students | Need the device (usually US$ 50,00 each) | Need a smartphone (almost all students have one) and wireless Internet connection |
| Teachers | In general, use Powerpoint and can't easily share questions, however, there is no limit to text length | Easily share activities in the Internet, however, there's a limit to text length in questions and alternative answers |
| Institution | There isn't necessarily a direct cost. Clickers can be bought by the students | Needs a good wireless Internet connection |

Kahoot can be used for many different purposes: Introduction of a new concept or topic; Reinforcement of knowledge; Encouragement of reflection and peer-led discussion; Connection of classrooms and Challenge for learners to make their own Kahoot quizzes. In order to get some experience in use, Kahoot system was applied to a universe of 1000 students in Physics I and II and Chemistry courses for freshman students in an Engineering School.

Introduction of a new concept or topic and Reinforcement of knowledge

Although new topics could be introduced by Kahoot (like teaching information and researching skills of students[7]), in this experimental study, teachers decided to use Kahoot only for reinforcing previous knowledge. This decision was made because, in this specific case, teachers' priorities were to assess students' learning and to see what the students' acceptance of Kahoot system would be.

On different occasions during the semester, the class started with a quiz, which aimed to strengthen some content already seen in previous meetings. In addition to resume concepts, this practice makes students aware of their learning process, since they are exposed to self-assessment. Also, Kahoot allows students to keep track of their knowledge level and to perceive any eventual difficulty regarding what is expected from them.

Students' opinion about Kahoot quizzes with instant feedback was that they worked as a tool for consolidating concepts. During the quizzes, students felt comfortable with answering in an anonymous way, and teachers could see that peer instruction was naturally happening.

Encouragement of reflection and peer-led discussion

The use of Kahoot overcame expectations when it came to individual reflection and peer-instruction. The fact that the quiz can be played through a cell phone increases students' engagement, since the use of new technological resources motivates students and shortens some distances between faculty members and students. Also, using electronic devices enriches the classroom experience due to the pluralization of the learning channels.

Considering that Kahoot quizzes present a game format, the natural competition among students makes the classroom a friendly and fun environment. This competitiveness enticement leads to more involvement, and Kahoot clearly motivated students to reflect on the concepts learned. Also, regarding peer-instruction, it was surprising to see so many in pairs and small groups discussions in each new question.

In conversation with students, it was found that individual reflection was encouraged because there is a goal to be achieved (being the winner of the game). Still, students say they feel comfortable in establishing discussions with colleagues without feeling ashamed for not mastering the content or for not using the appropriate technical language to discuss the issue. In discussion with partners, students feel free to question each other, which does not always happen when the other is the teacher. In addition, students also feel free to place their opinions without being afraid of any embarrassing exposure.

Some of the students' perceptions are shown below:

> *"I have problems with very slow classes. I easily lose focus and although I have no trouble understanding the subject, theory classes sometimes end up not helping much. The Physics teachers are usually very smart and they teach as much as possible, however, experiments in class usually help a lot! Kahoot questionnaires with immediate feedback explanation are an amazing way to get our attention and make learning easy and enjoyable. Thank you."*

> *"I would like to have more interactive lessons as the one we had using Kahoot."*

It's worth mentioning that, at the end of each quiz, the players are invited to rate Kahoot experience. In the Chemistry course mentioned before, 191 freshman students rated Kahoot and the following result (Fig.3) was found:

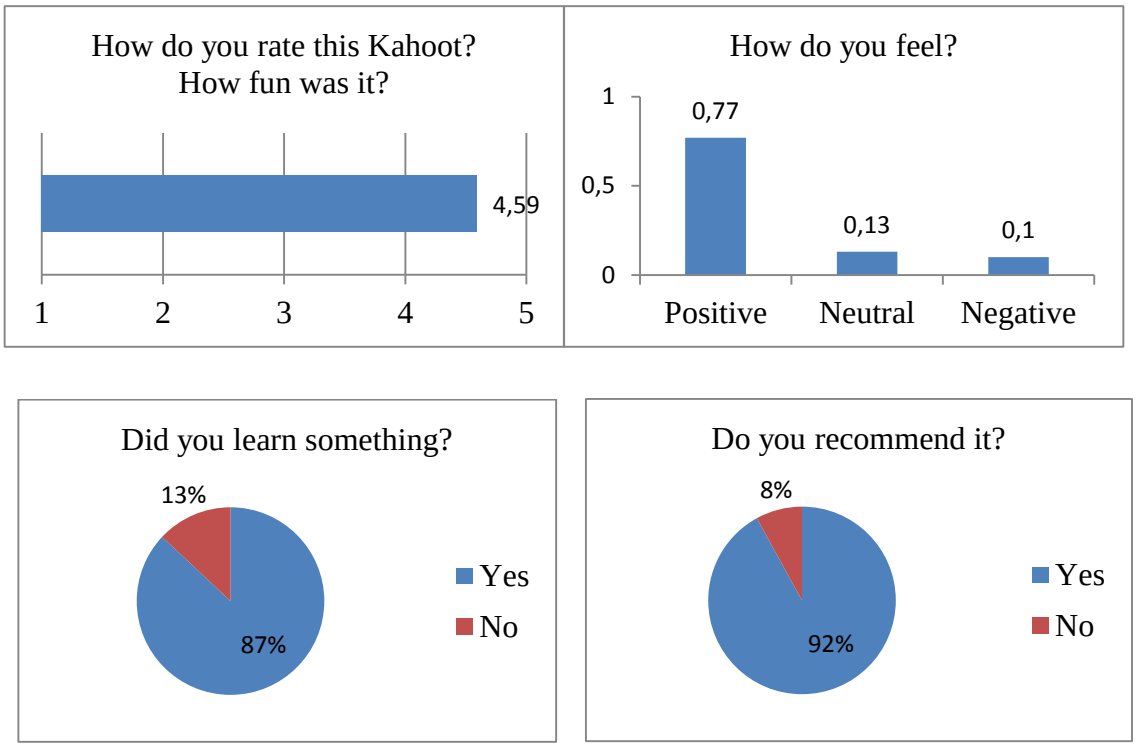


Fig.3 - Students' rating

The results shown in Fig. 3 suggest that Kahoot methodology was considerably accepted by the students.

Connection of Classrooms

Professors usually believe that different classrooms' demands are the same or very similar, but Kahoot makes it possible for the teacher to understand the real difficulties of each group. Issues considered easy by one classroom, sometimes have a low hit rate from another. This kind of information allows teachers to prepare lessons and adjust the program with higher quality. Therefore, teachers are able to design examples and exercises that meet the specific needs of each classroom. In order to better understand the differences between classrooms, students from two different classrooms (named "Classroom 1" and "Classroom 2") were submitted to the same following question during an electrochemistry lesson:

Consider the following overall reaction for a battery:

$$2\ Ag^{+} + Sn \rightarrow 2\ Ag + Sn^{2+}$$

What is the reaction quotient (Q) for this redox process?

a) $[Sn^{2+}].[Ag]^2/[Ag^{+}]^2.[Sn]$ b) $[Sn^{2+}]/2[Ag^{+}]$

c) $[Sn^{2+}]/[Ag^{+}]^2$ d) $[Ag^{+}]^2/[Sn^{2+}]$

The correct answer to the question above is letter c): $Q = [Ag^{+}]^2/[Sn^{2+}]$.

Although it seems to be a very easy question, is was possible to see (Fig. 4) that "Classroom 1" performed 18% better than "Classroom 2" for the same Chemistry question applied.

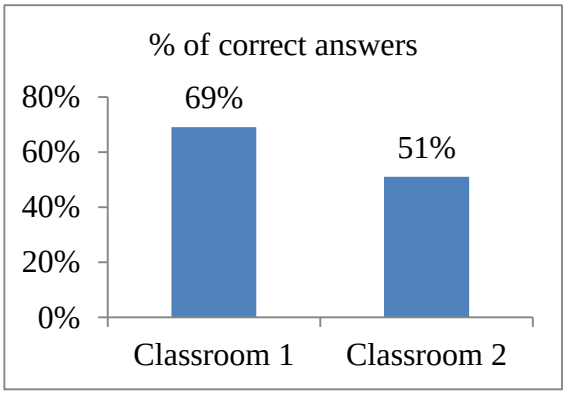


Fig.4 - Example of the differences between classrooms

As can be seen in Fig. 4, 69% of "Classroom 1" correctly answered to the question while "Classroom 2" had a lower performance (only 51% of correct answers). Having this quantitative information empowers the teacher, who can check the performance of each classroom question by question and understand what exact subjects are not clear for each classroom. This understanding can be very useful for designing specific lessons for each classroom according to the group's difficulties.

Challenge for learners to make their own Kahoot quizzes

Since it was the first time Kahoot was used, students were not invited to make their own Kahoot quizzes. This possibility will be explored in future works.

Best practices in Kahoot use

Kahoot system was applied in Physics I and Chemistry courses for freshman students and Physics II course for sophomore students in an Engineering School. Table 3 presents a compilation of the main results obtained.

Table 3: Kahoot as a tool and the best practices in use

| Course | Chemistry | Physics I | Physics II | Best practices found |
|---|---|---|---|---|
| Main purpose | Reinforcement of knowledge | Reinforcement of knowledge | Reinforcement of knowledge | Reinforcement of knowledge |
| Number of quizzes applied | 21 | 10 | 20 | - |
| Duration of the quizzes | 10 to 15 minutes each | 10 to 15 minutes each | 15 to 20 minutes each | 10 to 15 minutes |
| Number of questions in each quiz | 5 to 6 questions | 5 to 6 questions | 6 to 10 questions | 5 to 6 questions |
| Answer time for each question | 30 or 60 seconds maximum | 60 or 120 seconds maximum | 60 or 120 seconds maximum | Need to adapt for each discipline and type of question |
| Assessment | Not graded, only immediate feedback to students and teacher's evaluation of class comprehension | | | |
| Problems found | Internet access problems | | | |
| Benefits obtained | Immediate feedback<br>More interaction and involvement<br>Possibility to adjust methodologies in order to improve learning<br>More fun and enjoyable environment<br>Peer-instruction naturally encouraged | | | |

In general, a lower number of questions and a short time to answer each one make students pay more attention to the game and don't take much time. Considering that each class has usually 100 minutes, a 10 to 15 minutes activity shouldn't spoil the original plan for the class. The relatively short time of the activities made students stay motivated throughout the game. Considering that the quizzes were applied to large groups (30 to 80 students), the use of Kahoot in a long activity could have caused tedium and lack of interest. Dynamic and short activities seem to better serve the interests of this new 17 to 19 year-old generation. In order to explore different possibilities, quizzes were applied at the beginning, in the middle and at the end of some classes. Quizzes at the beginning of the lesson are interesting, since they work as an initial integrative activity and bring to light the content supposed to be the starting point for the current meeting. Quizzes in the middle of the class, after about one hour from the beginning, are also very interesting, since they are able to resume students' engagement after a usual long period of lecture. Finally, quizzes at the end of the lesson can be an interesting tool for the teacher, since they are able to measure students' understanding of the class without the effect of any further study or any period with no contact with the concepts learned.

According to students, quizzes at the beginning or in the middle of the classes seem to work better for the same reasons discussed above. Quizzes at the end of the class were not generally approved by the students, who claim that the involvement is lower in these conditions due to not having enough time to understand and discuss and to already being tired. Some students suggested that the scores achieved in the quizzes could compose part of the regular institutional assessment. This suggestion will be carefully analyzed by the teachers. In general, 92% of the students recommend it.

## Final considerations

The use of Kahoot in in-classroom activities introduced a new way to approach any content. Greater interaction between students, more attention in theory classes, and more motivation were observed. The possibility of accessing quizzes at home or at any other place shows a great potential. Also, Kahoot allows teachers to understand the differences among classrooms and therefore design activities that meet the specific needs of each group.

One of the difficulties in using Kahoot system consists of the fact that some students couldn't access the Internet, so they just kept up with the questionnaire, but didn't actually play the game. Many students discussed the answers with their partners and interacted intensively, which generated some interesting heated discussions.

At the same time Kahoot quizzes motivate interaction among students, there was a natural competition to answer each question correctly and in the shortest time possible. This suggests that, for the next class and activity, students will try to concentrate more in order to achieve that goal. It's worth to mention that most of the students considered the activity fun, 87% of the students considered that they had learned through Kahoot, 77% of the students felt positive about the use of that tool and 92% of them recommend it.

Finally, this system can be easily replied in other institutions and quizzes can be shared along world community.

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