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Smartphones y aprendizaje: el uso de Kahoot en el aula universitaria

Smartphones *and learning: use of Kahoot in the university classroom*

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Abstract

This article examines the use of Kahoot, a game based response platform, in the university classroom, based on the analysis of its use in two similar courses offered as part of the Bachelor's degree in Advertising and Public Relations (of the Antonio Nebrija University) during the 2015-2016 academic year. The study is based on the empirical-analytical examination of the use of the app, with different frequencies and repetition rates, by two groups of students, and a final survey that investigates students' perceptions of the tool. The results show that Kahoot is highly valued by students, who perceive it as a tool to enhance learning and increase competitiveness. It was confirmed that the repetition and frequency of use of the app contribute directly to its efficiency. However, students' learning outcomes, which were contrasted through the inclusion of Kahoot questions in mid-term and final exams, are lower than initially expected. In short, Kahoot is a good app to take advantage of students' smartphones as didactic tools to increase attendance and participation as well as to encourage participatory learning in the university classroom.

Keywords

Apps; learning; gamification; game; advertising; public relations

Resumen

El presente estudio aborda la utilización de Kahoot en el aula universitaria, analizando su uso en dos asignaturas análogas del Grado en Publicidad y Relaciones Públicas (Universidad Antonio Nebrija) durante el curso académico 2015-2016. Para el mismo, se empleó una metodología empírica-analítica utilizando la herramienta en los dos grupos, con frecuencias y repeticiones distintas, y se realizó una encuesta final al alumnado para conocer su percepción. Los resultados arrojan que Kahoot es altamente valorado por el alumnado, que lo percibe como una herramienta para mejorar el aprendizaje e incrementar la competencia en el aula. Se confirmó además, que la repetición y frecuencia de utilización de la aplicación contribuye directamente en la efectividad del mismo. No obstante, los resultados de aprendizaje, contrastados a través de la inclusión de preguntas de Kahoot en los exámenes parcial y final, son inferiores a los esperados inicialmente. En resumen, Kahoot es una buena aplicación para incrementar la asistencia y participación del alumno, utilizando el smartphone como aliado, e incentivando el aprendizaje de manera participativa en el aula.

Palabras clave

Aplicaciones; aprendizaje; gamificación; juego; publicidad; relaciones públicas

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1. Introduction

The inclusion of mobile devices and game-based tools in teaching methods has resulted in new opportunities for teachers and students. Virtual environments and collaborative work have become widely accepted due to their ability to enhance group work and interaction as well as leaning results of participants (Rubia, Jorrín and Anguita, 2009).

Gamification is understood as "the use of game-based mechanisms, aesthetics and game thinking to engage people, motivate action, promote learning and solve problems (Kapp, 2012). One of the objectives of gamification is to influence the behaviour of people, through the experiences and feelings that are built through games, encouraging commitment and loyalty of users, customers and workers (Ramírez, 2014) and using "motivation for the achievement of specific objectives" (Teixes, 2015: 18).

New technologies and the development of transmedia storytelling have helped gamification to evolve. A game does not have to be developed statically. It should allow the inclusion of devices as common and ordinary as the smartphone and the tablet. This fact opens up new possibilities to attract the generations accustomed to the use of technologies.

According to the 15th annual report on the information society in Spain (*Fundación Telefónica*, 2015), this country is the European leader in the use of smartphones, as 81% of all mobile phones in use are smartphones. In this sense, young people show greater knowledge of and dependence on smartphones. This problem has been identified in some studies, like the one carried out by *Universia* and *Trabajando.com* (2015), which found out that 51% of young Spaniards consider themselves to be dependent on the mobile phone. Likewise, the study on pathological behaviours on the Internet, carried out by the NGO *Protégeles (*2015), highlights that 21.3% of young people is at risk of becoming addicted to new technologies (*El País*, 2015).

Every day most teachers face this "surrounding use" of the smartphone (Cuesta, 2013), which easily distracts students in the classroom. To overcome this situation, it is necessary to integrate such devices as teaching tools. In this sense, mobile learning, or m-learning, promotes the inclusion of smartphones, alone or in combination with other types of information technologies, to facilitate learning. Several research works carried out by the United Nations Organization for Education, Science and Culture (UNESCO) (2013) have found that "mobile devices can help instructors use class time more effectively", especially to complete passive tasks and to memorise information, providing more time for the discussion and interpretation of ideas in the classroom. Similarly, UNESCO underlines that mobile learning offers more opportunities to cultivate the complex skills needed to collaborate with others in a productive manner.

The use of the smartphone and its inclusion in game practices in the classroom can be a first step in the generation of "narrative experiences" (Scolari, 2013). This use would allow students to better understand theoretical concepts and strengthen certain skills through interactions and interpersonal relationships derived from gaming. Likewise, and from the point of view of the student, we must not forget that the smartphone has become a "curator of content, increasingly selective and critical towards information and with capacity to find the contents that are addressed in university studies" (Rodríguez, 2015), which turns this type of experiences into an incentive for students to attend class.

In terms of gamification with smartphones, applied to the field of public relations and corporate communication, some authors have begun to study its implementation from the professional point of view, emphasising its capacity for customisation. These new links enable a higher level of involvement with the public, increase the engagement, virality and notoriety of campaigns, and promote the creation of communities (Estanyol, Montaña and Lualueza, 2013). On the other hand, the academia has addressed its relationship in the project #dametuits (González and Amieva, 2014), aimed at promoting the U-Tad University (Technology and Digital Art University) through the participation of employees in social networks. Both studies demonstrate that gamification can generate innovative experiences in public relations at the professional and teaching spheres.

1.1. Kahoot in university education

Kahoot is a free tool that has gained popularity among teachers for its simple use and its capacity to establish work dynamics in the classroom. This application facilitates the creation of surveys, questionnaires and discussions, and the collection of feedback from students in real time. On the one hand, and in the case of questionnaires, which are the object of study in this article, the teacher formulates the questions and determines the number of responses as well as the time available for the student to answer. The questions are projected in the classroom and the student answers them through the smartphone within the

given time. Kahoot displays the winner of each question and shows the accumulated points to provide a final ranking, as if it were a competition.

The use of Kahoot as an educational tool has been already studied at the university level in different areas such as the bachelor's degree programmes in Information and documentation, Computer engineering, Physics, Computational mathematics, Motor and sport activity, and Elementary education of the University of Valencia (Fuertes *et al*. 2016); the bachelor's degree programmes in Dentistry of the European University of Madrid (Pintor, Gargantilla, Herreros and López, 2014); and the bachelor's degree programmes in Law and Elementary education of the University of Alicante (Moya, Carrasco, Jiménez, Ramón, Soler and Vaello, 2016).

Moreover, there are two similar research projects addressing the use of Kahoot at the European level. The first of these projects discusses the use of Kahoot in the English language course offered as part of the bachelor's degree programmes in Information technology, Polish Language and literature, Public administration, Political studies, Sociology, Cultural studies and Philosophy of the Pedagogical University of Cracow, Poland (Zarzycka, 2014). The second project studied the implementation of the tool at the Norwegian University of Science and Technology (NTNU), comparing it with paper-based games and click-based game methods. There are also other studies of interest focused on the non-university sector such as "Apps for mobile devices: manual for teachers, trainers and librarians" (*Apps para dispositivos môveis: manual para profesores, formadores e bibliotecários*) (Guimaraes, 2015), "Learning by playing, solving: designing positive learning experiences" (*Aprender jugando, resolviendo: diseñando experiencias positivas de aprendizaje*) (Del Cerro, 2015) and "Free-distribution answer systems for use in the classroom with mobile devices" (*Sistemas de respuestas en el aula de libre distribución para uso con dispositivos móviles*) (Carrera and Álvarez, 2015), among others.

All the aforementioned studies agree that Kahoot is a good tool for classroom activities and that it improves student participation, fostering positive relationships between teacher and students, and among students. The result, as Del Cerro (2015) points out, is also a higher rate of class attendance, which makes Kahoot an interesting tool for students, who perceive it as a game and not an evaluation system (Fernández, Olmos and Alegre, 2016). In fact, the creator of Kahoot, Alf Inge Wang, points out, in the study conducted at the Norwegian University of Science and Technology (NTNU), that students who used Kahoot learned 22% more than the students who used other game dynamics. On the negative side, the time required for its preparation and implementation, the need for permanent internet connection and the possibility of plagiarism among students, are listed as some minor disadvantages.

So far there are no research studies addressing the use of this application in study programmes in the area of communications. Likewise, the aforementioned studies delve into the uses of the tool and its assessment by students. However, they do not contrast or evaluate the learning outcomes. In this sense, it is necessary to determine whether Kahoot, as a potential gamification tool, contributes to the improvement of learning, in addition to generating participatory dynamics in the classroom.

2. Materials and methods

This study addresses gamification as a work tool in the classroom, based on an empirical-analytical method and the application of Kahoot questionnaires, with similar contents, in two similar courses on public relations, offered as part of the Bachelor's degree in Advertising and Public Relations of the Antonio Nebrija University. These courses were taught during the second semester of the 2015-2016 academic year. The students, who had similar ages and conditions, had the option of accessing the course content in advance and attended a face-to-face class which revolved around one topic and involved the answering of one final Kahoot questionnaire on that topic.

The first group was composed of 23 students (Group 1) who were enrolled in the course "Principles of public relations" and were aged between 18 and 25 years. During the fourth-month period, a total of 6 topics were addressed and 5 games were played.

The second group was composed of 20 students (Group 2) who were enrolled in the course "Public relations techniques" and were aged between 20 and 22 years. During the fourth-month period, a total of 8 subjects were taught and 4 games were played.

Both groups worked with the same application (Kahoot) but with a different game frequency and repetition. In the case of Group 1, one game was used per each topic, while in the case of Group 2 one game was used for every two topics. Each game consisted of 15 questions that offered three answer options, and a single correct option. In the first round, the student had 10 seconds to answer each question. When the game was repeated, i.e., in the second round of the game, the time was reduced to 5 seconds.

It is important to note that a maximum of two repetitions per game was established, so that each group could play the Kahoot about the same topic twice. However, and in order to verify the effectiveness of the repetition, in the case of Group 2, the first two games were not repeated.

The study was based on the following hypotheses:

Hypothesis 1. Kahoot helps improve the memorisation of concepts, facilitating students' study.

Hypothesis 2. Learning outcomes are higher thanks to the use of the game in the classroom.

Hypothesis 3. Kahoot's effectiveness depends on the repetition and frequency of the questionnaires.

Hypothesis 4. Students are satisfied with the game and perceive it as a technique that improves their competitiveness, performance and results.

In order to verify whether Kahoot contributed positively to the learning outcomes, the midterm and final exams taken by both groups included questions used in the games. This allowed us to see whether the rate of correct answers increased or reduced with respect to those questions which had not been addressed in the classroom.

Thus, the mid-term exam of both groups included 20 test-type questions, of which 10 had been previously answered through Kahoot. Meanwhile, the final exam included 5 test- type questions, of which 3 had been answered previously in the game.

To learn the opinion of students, a qualitative survey was conducted among both groups at the end of the course. A total of 41 results were obtained. The survey questionnaire included the following yes/no questions:

Q1. Had you previously used a gamification tool in the classroom?

Q2. Has the use of Kahoot been helpful on this course?

Q3. Do you think that the use of this type of tools in university education is necessary?

Q4. Would you recommend the use of Kahoot in the classroom to other teachers?

Students were then asked to rate the degree in which the tool had helped them in the development of the course, using a 5-point scale (1, Poor; 2,3 and 4, good; and 5 excellent).

- Rate the degree in which Kahoot has helped you in the learning of the course content
- Rate the degree in which Kahoot has helped you in the memorisation of concepts
- Has Kahoot increased your competitiveness in the classroom?
- Has this tool reduced the study time dedicated to the subject?
- Has Kahoot motivated you to read in preparation for each exercise?
- Please rate your degree of satisfaction with this application

3. Analysis and results

The first point of analysis is the rate of correct answers obtained in each game. As mentioned, each game could be played a maximum of two rounds. This repetition allowed us to compare the percentage of correct and wrong answers, as expressed in the following table:

Table 1: Results of the Kahoot questionnaires. Group 1

	Group 1									
	Kahoot Match No. 1		Kahoot Match No. 2		Kahoot Match No. 3		Kahoot Match No. 4		Kahoot Match No. 5	
	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
Percentage correct answers	61%	72%	60%	87%	57%	77%	44T	64%	62%	87%
Percentage of wrong answers	39%	28%	40%	13%	43%	23%	46%	34%	38%	13%

Source: Authors' own creation. (R = round)

The first rounds of each match obtained between 54% and 62% of correct answers, which is a fairly high percentage that indicates that the contents are interpreted and memorised without difficulty. This percentage usually increases 11% to 25% in the following match (See table 1).

Table 2: Results of the Kahoot questionnaires. Group 2

	Group 2					
	Kahoot Match No. 1	Kahoot Match No. 2	Kahoot Match No. 3		Kahoot Match No. 4	
	R1	R1	R1	R2	R1	R2
Percentage of correct answers	56%	62%	63%	69%	66%	80%
Percentage of wrong answers	44%	18 g	37%	31%	14g	20%

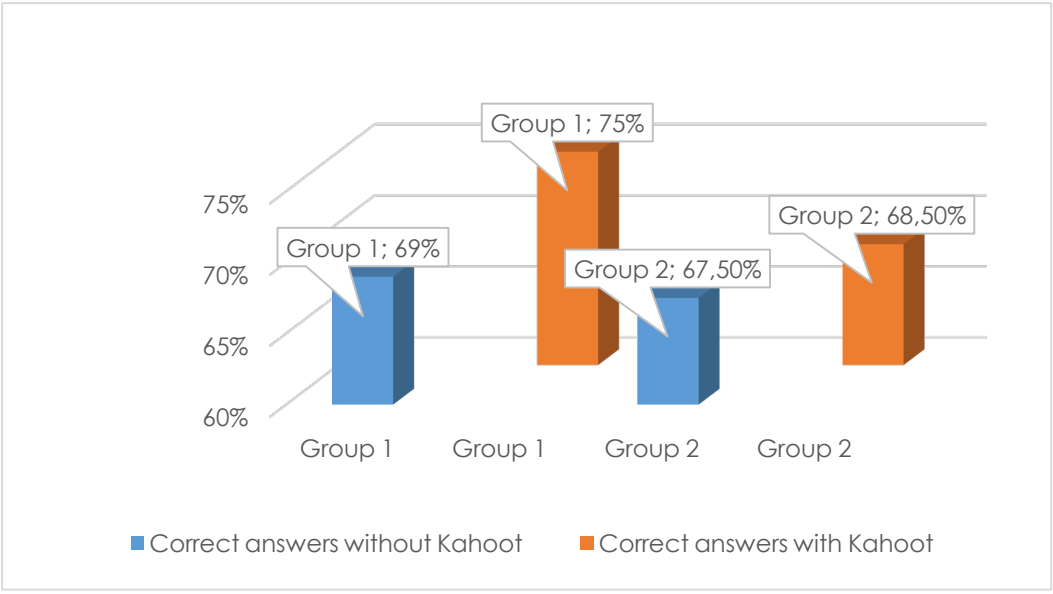
Source: Authors' own creation. (R = round)

In the case of Group 2, the first two matches, corresponding to the topics 1, 2, 3 and 4, which were addressed in the mid-term exam, did not involve a second round. This was done to verify, as it will be shown later, whether there were any significant differences in the rate of correct answers in the test in comparison to Group 1.

The highest percentages of correct answers were obtained in the final rounds and generally in the second match of each game, as it was the case with Group 1 (e.g.: see table 2).

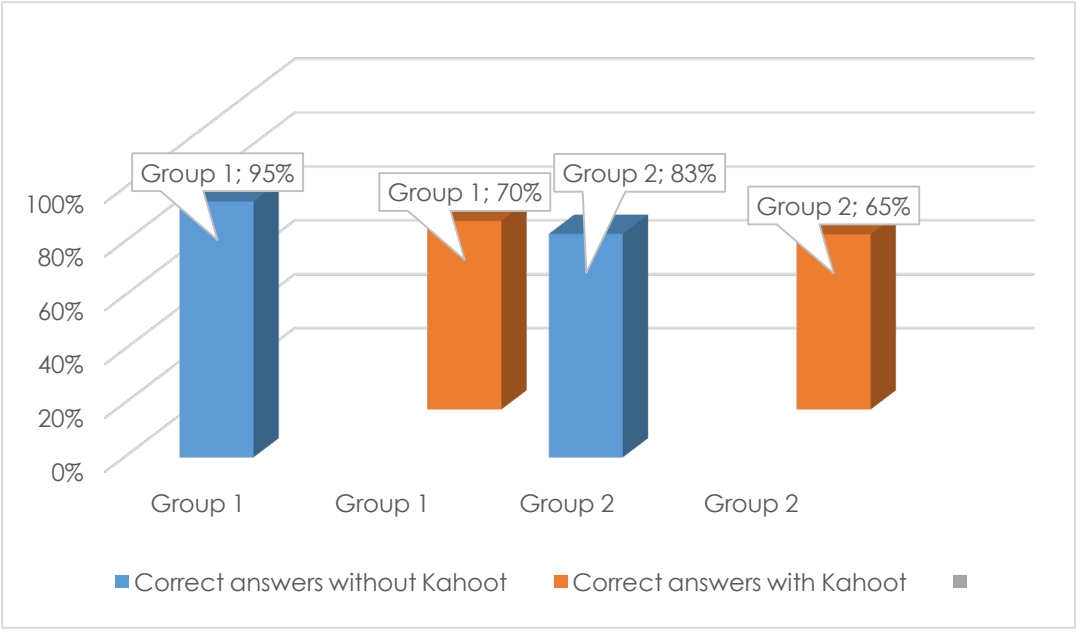
On the other hand, as mentioned, we aim to verify whether the learning outcomes were related to the game. Thus, the mid-term exam of both groups contained 20 test-type questions, of which the first half corresponded to original questions, not seen in the classroom, while the second half had been introduced in the Kahoot questionnaires. For the Group 1 the average of correct answers was 69% in the first half, and 75% in the second half, which was addressed in Kahoot (e.g.: see figure 1). This increase, which may seem minor, does not occur in Group 2, in which the average percentage of correct answers is 67.5% in the first part and 68.5% in the second part (e.g.: see figure 2). In other words, in Group 2, where a lower game frequency and repetition was applied, the rates of correct answers in the first and second parts are practically the same.

Figure 1: Mid-term exam. Percentage of correct answers



Source: Authors' own creation.

Figure 2: Final exam. Percentage of correct answers



Source: Authors' own creation.

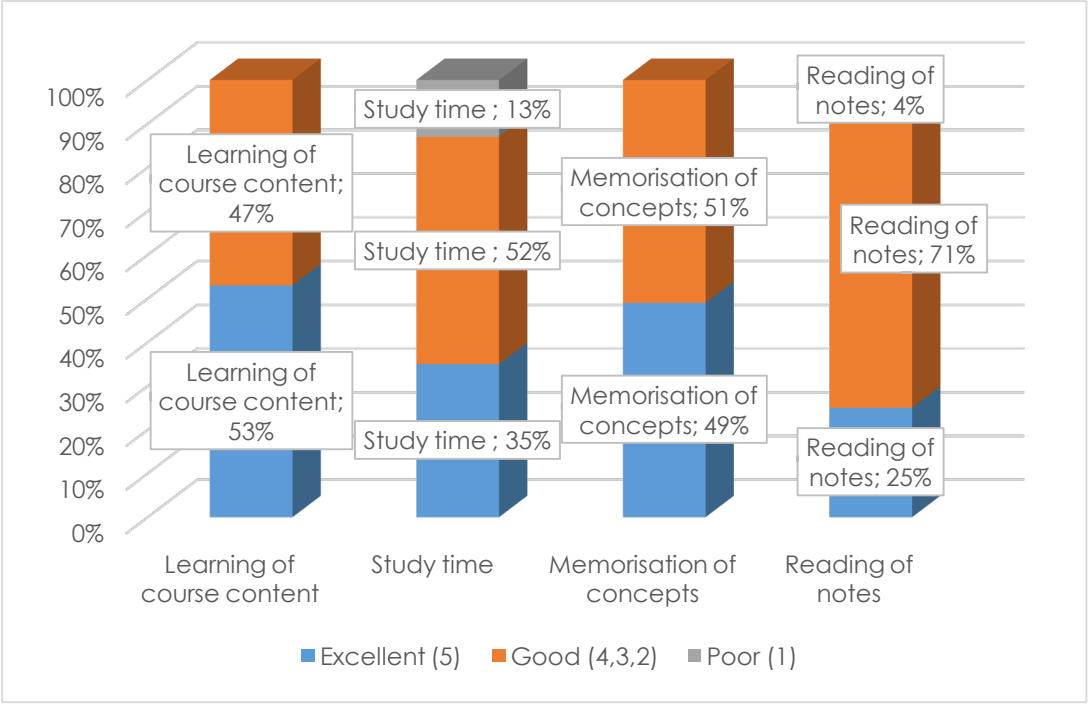
However, the results of the final exam did not indicate that Kahoot had contributed to improving the memorisation of concepts. In this case, a set of five test-type questions was included: the first three were original questions and the following two were questions that had been included in Kahoot. In the case of Group 1, the rate of correct answers was 95% in the first part and 70% in the part introduced though Kahoot; While in the Group 2, the rate of correct answers was 83% in the first part and 65% in the second one. These data may be related to the relevance of the final exam, which has higher value than the mid-term exam and encourages students to study in greater depth.

With regards to the surveys applied to students, the results are practically identical and that is why they are presented together. 82.5% of students had not previously used a gamification tool in the classroom and 100% admitted that Kahoot was useful for them. 60% did not consider that the use of such tools in higher education is necessary, although 100% would recommend its use to other teachers.

In terms of the assessment of the tool, 75.6% of students rated their degree of satisfaction as excellent and 51% rated the degree to which their competitiveness increased in the classroom as excellent.

Students valued positively the tool in relation to the learning outcomes (e.g.: see figure 3). 47% of students valued the degree in which the game helped them to learn the course content as good and 53% as excellent. This degree of satisfaction is similar to the one shown when assessing whether the tool had reduced the study time dedicated to the subject: 52% rated it as good, 35% as excellent and 13% as poor. Likewise, students value positively the degree in which Kahoot has helped them memorise concepts: 51% rated it as good and 49% as excellent. In terms of the degree in which the application encouraged the reading of the notes before each exercise: 71% rated it as good, 25% as excellent and 4% as poor.

Figure 3: Students' assessment of Kahoot



Source: Authors' own creation.

4. Discussion and conclusions

Kahoot is emerging as a game-based tool that enables the gamification and inclusion of the smartphone in the classroom. This work has analysed the use of Kahoot in two courses that are part of the Bachelor's degree in Advertising and Public Relations.

The first hypothesis proposed that the use of the game in the classroom contributes to improving the memorisation of concepts, and facilitates the understanding of the course by students. The results of the surveys indicated that Kahoot has improved students learning, has facilitated the memorisation of concepts, and has reduced their study time. In all of these aspects, students offered a good assessment of the application. However, the learning outcomes evidenced in the mid-term and final exams may question the effectiveness of the tool. In this respect, and in relation to the second hypothesis, which proposed that learning outcomes are higher when Kahoot is used, we observed that there is no difference in the rate of correct answers to questions seen in Kahoot in comparison to questions not included in Kahoot. Only the results of the mid-term exam show that, in group 1, which plays with greater frequency and repetition, answers a greater number of the questions included in Kahoot than questions specifically formulated the exam. Nevertheless, it should be noted that these results are determined by the time dedicated to study by students, which is always longer when they face final exams. In fact, the percentage of correct answers in the final exam are higher in both groups with respect to the mid-term exams. Still, there is no doubt that gamification has positive motivational effects (Hamari, Koivisto and Sarsa, 2014). Perhaps, and for further research, it would be interesting to develop specific tests to be taken before and after the game to determine whether the tool actually has a direct impact.

The third hypothesis proposed that the effectiveness of Kahoot depended directly on the repetition and frequency of use. In this regard, tables 1 and 2 show that more correct answers are always obtained in the second rounds. Therefore, it can be concluded that the effectiveness of the game in learning is related to the repetition and frequency with which it is used.

The last hypothesis affirms that students are satisfied with the game and perceive it as a tool that improves their competitiveness, performance and results. There is no doubt that students are highly satisfied with the application and value it as another learning method. However, we must not ignore the fact that 60% of students considered that it was not a fundamental tool in university education. We believe, and this is a subjective assessment, that this perception could be related to stereotypes and preconceived ideas about university teaching: a master class in which the practical part is almost always focused on exercises, presentations and group work. In fact, this assessment is based on another result of the survey: 100% of students would recommend the use of the application to other teachers.

It is important to note that beyond the data provided by the surveys and the field work, Kahoot proved to be a valuable tool that improved the attendance and participation of students in the classroom. Both groups created a community around the tool and were engaged in the activity, which are two objectives that tend to be included, by definition, in any public relations campaign.

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