Chapter #16

ONLINE QUIZZES FOR CONTENT CONSOLIDATION IN HIGHER EDUCATION: A COMPARATIVE STUDY IN TOURISM DEGREES

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ABSTRACT
New strategies regarding student-centered approaches have emerged in higher education contexts, to promote student motivation and engagement towards the learning process. Online quiz platforms such as Kahoot! seem to contribute to the consolidation of learning, particularly through content review.
Our research is based on data from a quantitative survey conducted among students from a Portuguese higher education institution offering undergraduate degrees in the area of Tourism, specifically within the subjects of English and Statistical Analysis. Following a consistent application of Kahoot! quizzes in class for reviewing purposes, the survey was implemented to allow for an examination of how the students perceived the usage of this game-based learning tool.
Results show that most students are very receptive to this tool and highly recommend it, as it promotes motivation. Students also consider the use of Kahoot! in classes to make learning more challenging and dynamic, while positively contributing to content consolidation.
To better understand students' responses to the platform, in this study we aim at analyzing the results according to area of study and investigating different correlations between variables.
However, the results obtained evidence that further studies are needed to confirm the effect on the use of Kahoot! in student performance.

Keywords: higher education, web tools, content consolidation, motivation, gender, technology receptiveness.

1. INTRODUCTION

In the last few decades, higher education has been confronted with a number of substantial changes, which have impacted both students and faculty. On the one hand, the number of students accessing higher education has grown exponentially and, as a consequence, the student-teacher ratio has changed and the student body has become more and more heterogeneous (Olssen & Peters, 2015). This democratization of higher education brought with it many social and economic benefits but aggravated already existing challenges across all education levels regarding student commitment, compromise and motivation (Kember, Leung, & Prosser, 2021). Another recent major transformation in higher education came as a result of the widespread use of information and communication technologies (ICTs), supported by the advent of the Internet. Technology was adopted in higher education not only at the institutional level, through the offer of blended learning or online learning, but also as a means to innovate teaching methods in face-to-face classes (Dečman, 2015). The use of technology in face-to-face classes led to a process of reform

and innovation, as it allows the development of student-centered activities that involve cooperation and active participation, thus altering the traditional role of faculty and students (Wang, Wu, & Wang, 2009; Guardia, Del Olmo, Roa, & Berlanga, 2019). Considering that higher education students are mostly digital natives, known for their dependency on information technology and lower attention span, the adoption of game-based learning platforms can help improve students' learning experiences in higher education (McCoy, 2010; Lister, 2015).

2. THEORETICAL BACKGROUND

This article includes a reflection on how the use of a specific game-based learning platform, Kahoot!, can improve the learning experiences of students in higher education, especially students in the field of Tourism. Within the subjects of Statistical Analysis and English, the researchers resorted to Kahoot!, accessed by students through their mobile devices, in order to revise contents throughout the semester and to encourage and increase their participation and motivation during classes.

Online quizzes can foster engagement, challenge learners, and support content review, making them effective educational tools. Paturusi, Chisaki and Uzagawa (2014) discuss how online tests are created and assessed as helpful resources to improve student performance. According to the authors, "the students' results revealed that these online quizzes can be utilized as an assessment tool to enhance students' performance in learning. By [using] this particular tool, students can make self-assessment about their achievement in learning because the quizzes are automatically corrected and provide as grade for students." (p. 215).

In another perspective, Nuci, Tahir, Wang, and Imran (2021) found that in-lecture quizzes increased students' engagement and interaction levels. Results pointed to four major conclusions, namely: (i) systematic online quizzes can impact students' engagement and motivation; (ii) the interactivity among professors and students increases when using systematic in-lecture quizzes in online classes; (iii) systematic online quizzes impact class dynamics; (iv) including the strategy of having systematic in-lecture quizzes in the teaching plans will impact students' exam performance.

Furthermore, another study reveals that online quizzes can foster engagement, challenge learners, and support content review (Grinias, 2017). The author states that "the use of competitive quiz-based games utilizing web-based student-response systems for comprehensive exam review was reported by students to be both helpful and fun in a quantitative analysis course" (p. 1365).

We are now going to explore the use of these tools in two different fields of study, specifically Mathematics and English Language Learning.

In the case of Mathematics, technology has become essential because the teaching and learning processes are enriched with the use of technologies improving the students' motivation and the students' learning process (Bullon, Encinas, Sanchez, & Martinez, 2018; Zabala-Vargas, García-Mora, Ardila-Segovia, & de Benito-Crosetti, 2019). ICTs are tools that innovate the way mathematics is taught and they may facilitate students' learning (Scanlon, Buckingham, & Burn, 2005).

As far as English language learning is concerned, game-based learning can help to cultivate positive attitudes and increase motivation level of participants, while allowing for language practice, namely easiness of grammar or lexical revision and better acquisition of new structures (Veljković Michos, 2017).

Several authors have studied students' acceptance to the integration of technology in education (Thongkoo, Daungcharone, & Thanyaphongphat, 2020; Raes & Depaepe, 2019). However, few studies investigate the relationship between gender / area of study and game-based learning acceptance, specifically, hence the relevance of our research.

3. OBJECTIVES

The aim of this study is to determine how Tourism students perceive the use of Kahoot! in higher education, more specifically within the context of Mathematics and English classes, with three groups of students. Although the specific name of the subject is Statistical Analysis, the contents refer to the general area of Mathematics, so henceforth we mention this particular field in a theoretical perspective and the subject name in the context of the study.

Following the general results in a previous article (Pais, Pires, & Chagas, 2018), a new perspective of data is presented in the current study, in light of the distinction between these two different subjects, so as to identify the main dissimilarities between them. Additionally, new correlations between variables are investigated, such as (i) gender vs receptiveness to Kahoot!, (ii) gender vs recommendation of use and (iii) technology readiness vs receptiveness to Kahoot!.

Therefore, the first objective of the study is to investigate and understand how online quizzes, specifically using the Kahoot! platform, are useful for reviewing academic content.

The second objective is to evaluate the impact of online quizzes, particularly Kahoot!, on student motivation within the higher education context, especially assessing how the gamified structure of activities influences students' interest for learning.

The third objective is to explore correlations between specific variables, as previously mentioned. This involves a thorough examination of survey data to identify any trends or distinctions between the opinions and recommendations of male and female students on Kahoot! Additionally, the study aims to investigate the influence of students' technology readiness on their receptiveness to this game-based learning tool.

This way, we believe we can contribute to a more comprehensive understanding of the factors that influence student attitudes to educational technologies.

4. METHODS

In this case study, the authors used a game-based learning platform in class, namely Kahoot!, which students could access through their mobile devices, with the intention of encouraging them and promoting their participation and motivation. The platform was used in three lecture classes that corresponded to the conclusion of a syllabus topic. Kahoot! quizzes were therefore mainly used for reviewing class content.

A satisfaction survey was used to gather information about Tourism students' perceptions and quantitative data were collected. A few general questions were adapted from Esteves, Pereira, Veiga, N, Vasco, and Veiga, A (2018) but other questions were added with the intention of analyzing the effect of the use of Kahoot! in the context of Mathematics and English. For those questions a five-point Likert scale was used. For some questions, 1 corresponded to "not at all" and 5 to "very much", while in other questions 1 corresponded to "not important" and 5 to "very important".

A statistical analysis of the data was performed using Excel and IBM Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics (mean, median and standard deviation) were computed to examine the results that were obtained in the

different areas of study. A multivariate analysis was also performed in order to understand the relationship between different variables, firstly analysed through descriptive statistics. At the multivariate level, contingency tables were used in order to analyse pairs of variables and verify independency tests, through Pearson's Chi-Square, with α=5% (significance level):

Figure 1.
Chi-Square Statistics.

$$\chi^2 = \sum_{j=1}^{m}\sum_{k=1}^{n} \frac{\left(n_{jk} - \frac{n_{j.}n_{.k}}{N}\right)^2}{\frac{n_{j.}n_{.k}}{N}}$$

4.1. Respondents

The respondents of this case study were 86 undergraduate students from a Portuguese higher education institution, in the academic year of 2017-2018. The curricular units, henceforth referred to as CU (English for Events II, English for Recreation IV and Statistical Analysis) were set within Tourism-related degree courses. In particular, 32 were English students, whereas 54 were Statistical Analysis students.

Table 1.
Distribution of participants.

	Participants	Respondents
English	48	32
Statistical Analysis	60	54
Total	108	86

From the 86 respondents, 66 (77%) are female and 20 male (23%), as shown in the table below (Table 2).

Table 2.
Gender of respondents.

	Respondents
Male	20
Female	66
Total	86

5. RESULTS AND DISCUSSION

The highest mean score in both subjects is related to item 3 "It was fun using Kahoot!" (English: m = 4.78, sd = 0.491; Statistical Analysis: m=4.65, sd=0.555). Therefore, high scores in both items show that all students, regardless of the CU attended find it fun to use Kahoot!.

As far as the lowest mean scores are concerned, results converge in both subjects with item 2 “Using Kahoot! will contribute to having a better grade in the CU”. The results were m = 3.75, sd = 1.016 in English I and m = 3.43, sd = 0.983 for Statistical Analysis, as shown in the table below (Table 2). High standard deviation values seem to imply, however, that the students’ opinion is not consensual. (English: sd=1.016; Statistical Analysis: sd=0.983). Also, despite being the lowest score, the mean is relatively high, as we can see in table 3.

The survey results corroborate that using Kahoot! provides a less rigid method of learning, makes it more interactive and interesting (Q9), makes classes more active, lively and dynamic (Q10) and that students recommend using Kahoot! (Q6). The results also indicate that the students consider it important for the teachers to resort to different teaching-learning methodologies such as Kahoot! in the classroom. However, this result does not appear to be highly consensual to the English students (sd=0.950).

The results on the platform’s contribution to a more positive view of the CU show that, even though the mean is considerably high (superior to 4 in the 3 CUs), students' opinions are not consensual because they present a high value for the standard deviation (English: sd=0.907; Statistical Analysis: sd=1.060). The question “The response time in Kahoot! is adequate” also does not appear to be consensual among the English (sd=0.096) and Statistical Analysis students (sd=0.951), and the question “It facilitates the interaction between lecturer and student” does not appear consensual among the English students (sd=1.045). The average scores for both CU show that results are slightly higher in English (4.40) than in Statistical Analysis (4.21).

The survey results are presented in Table 3.

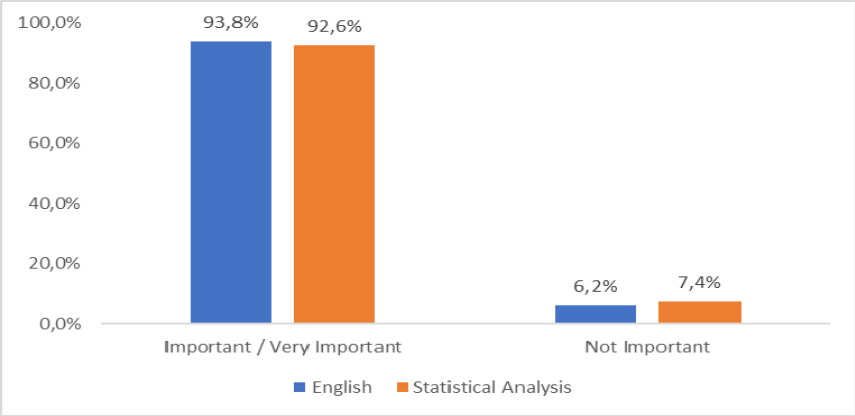
Table 3.
Results of individual survey according to curricular unit (CU).

	English			Statistical Analysis		
	Mean (1 to 5)	Std Dev	Median	Mean (1 to 5)	Std Dev	Median
1 - I believe that Kahoot! contributed to consolidate the contents of the CU.	4.06	1.014	4	4.09	0.875	4
2 - Using Kahoot! will contribute to having a better grade in the CU.	3.75	1.016	4	3.43	0.983	3
3 - It was fun using Kahoot!.	4.78	0.491	5	4.65	0.555	5
4 - The response time in Kahoot! was adequate.	4.31	0.896	4.5	4.04	0.951	4

5 - I find it important to be able to see the scoreboard.	4.25	0.803	4	3.81	1.150	4
6 - I recommend using Kahoot! in the classroom.	4.44	0.759	5	4.41	0.659	4.5
7 - It contributes to a more positive attitude towards English/ Mathematics.	4.38	0.907	5	4.17	1.060	4
8 - It makes learning more challenging, interesting and stimulating.	4.38	0.793	4	4.22	0.793	4
9 - It provides a less rigid learning method making it more interactive and interesting.	4.53	0.621	5	4.37	0.623	4
10 - It contributes towards more active, lively and dynamic classes.	4.56	0.564	5	4.50	0.575	5
11 - It facilitates the interaction between lecturer and student.	4.44	1.045	5	3.98	0.879	4
12 - I find it important for lecturers to use different strategies such as Kahoot! in the classroom.	4.47	0.950	5	4.48	0.720	5
Average score	4.40			4.21		

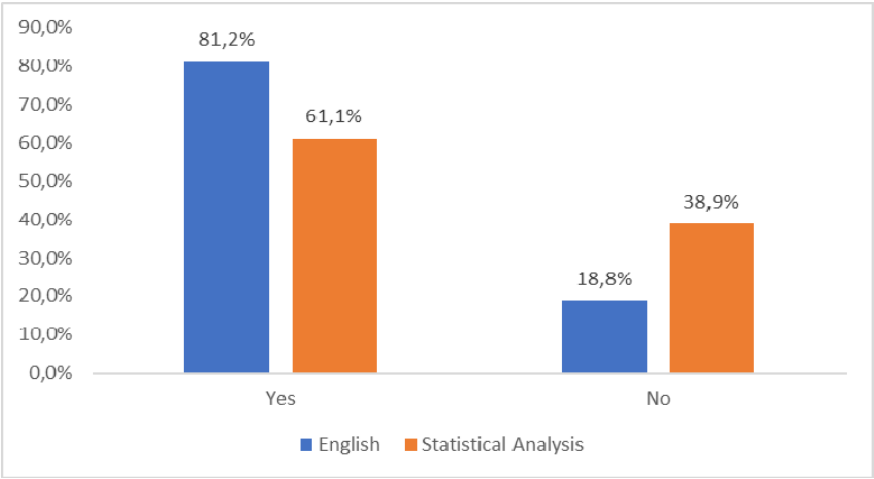
Regarding the question "Do you consider the use of Kahoot! in classes to be important?", results are very high in both subjects (93,8% for English and 92,6% for Statistical Analysis), with a slightly higher percentage for English. The results are shown in figure 2.

Figure 2.
Do you consider the use of Kahoot! in classes to be important?



As for the question "Did Kahoot! help you like the CU better?", results are also high (81,2% for English and 61,1% for Statistical Analysis), but not as much as in the previous question. Moreover, in this question we can find a more pronounced difference between the two subjects (nearly 20%). The results are shown in figure 3.

Figure 3.
Did Kahoot! help you like CU better?



Regarding the general results, other studies show similar conclusions, not only about the fact that higher education students finding the use of Kahoot! as fun and entertaining, particularly in Maths (Bullon, Encinas, Sanchez, & Martinez, 2018).

More specifically, literature shows that Kahoot! can foster and reinforce English learning in undergraduate students, by inducing motivation as well as engagement (Bernal, Ares, Bernal, Nozal, & Sánchez, 2018), providing a meaningful language learning experience (Kaur & Naderajan, 2019). In parallel, Maths students find this platform to be

beneficial, as it allows them to "self-evaluate their learning process" (Curto Prieto, Orcos Palma, Blázquez Tobías, & León, 2019, p. 10).

Furthermore, we can find evidence on how this platform can set up a positive atmosphere in more lively and dynamic classes in these specific subjects: "It was found that Kahoot! had a positive effect on learning both for K-12 and higher education, as well as for language learning, technical and engineering fields, science, math, business, and nursing" (Wang & Tahir, 2020, p. 12).

In order to observe the non/existence of independency among variables, multivariate analysis was also performed using the Pearson Chi-Squared Test. Contingency tables analyses have been used, through the independency test of Pearson Chi-Squared, in order to understand if:

- there are relationships between different variables and the curricular units that should be considered;
- there are relationships between different variables and the gender that should be considered;
- there are relationships between variable 2 ("I consider the use of Kahoot! in classes to be important") and variable 3 ("I feel comfortable using electronic gadgets") that should be considered (p-value=0.618).

The results show that for a significance level (α) of 5%, all the crossings obtained a p value higher than 0.05, which means that there is no relationship between the variables when crossed with the curricular units and with the gender (Table 4).

Table 4.
Variables crossed with curricular units and gender.

Variables	**Curricular Units**	**Gender**
	Pearson Chi-Squared Test	Pearson Chi-Squared Test
1- I recommend using Kahoot! In the classroom	(=0.293)	(=0.551)
2- I consider the use of Kahoot! in classes to be important	(=0.158)	(=0.105)
3- I feel comfortable using electronic gadgets	(=0.550)	(=0.701)

6. CONCLUSION

One of the main conclusions of this study is that students tend to show a very positive attitude towards the use of technology in general and specifically towards Kahoot!.

With regard to the differences between students' perceptions in two disparate subjects, namely English and Statistical Analysis, the survey results indicate that mean scores are generally similar, although they are slightly higher in English.

Lower scores concerning students' perspective on the use of Kahoot! to improve their grades are not in line with the conclusions of other studies (Aljaloud, Gromik, Billingsley, & Kwan, 2015; Esteves, Pereira, Veiga, Vasco, and Veiga (2018)), so a deeper analysis on

this perspective would be relevant, as there are only few studies pertaining to this topic (Wang & Tahir, 2020).

Another important result refers to the non-existence of significant differences in terms of gender and area of study (English and Mathematics) regarding the variables examined. Other studies (Izquierdo-Álvarez, Lahuerta-Otero, & Cordero-Gutiérrez, 2018) had similar results regarding gender.

Future studies should focus on the impact of online quizzes in academic performance. In this respect, Zainuddin, Shujahat, Haruna, and Chu (2020) found positive results when comparing them to traditional methods, as they concluded "that the employment of innovative gamified e-quiz applications and paper-based quizzes were effective in evaluating students' learning performance, particularly as formative assessment used after the completion of each topic" (p. 103729). Besides, Bognár, Fauszt, and Váraljai (2021) found that self-monitoring practice and instant feedback can contribute to the effectiveness of learning.

A few recommendations in the context of the use of online quizzes in class might involve their incorporation into different subjects. Moreover, the development of training programs or workshops in designing and implementing effective online quizzes could be important. This could involve not only technical aspects but also strategies for fostering student engagement and motivation through gamified learning experiences. Finally, it should be important to assess how the implementation of gamified learning tools can work on knowledge retention and academic achievement.

In sum, bearing in mind that Kahoot! provides "opportunities to engage with the lecturer, peers and lecture content" (Licorish, Owen, Daniel, & George, 2018, p. 21), it is the authors' belief that this study can positively contribute to disseminate new strategies that can impact students' motivation for learning and ultimately their academic performance.

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