

# A New Approach to Perform Individual Assessments at Higher Education Using Gamification Systems

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## Abstract

Assessment is a crucial element of the educational process, but traditional pen-and-paper tests have limitations in promoting active learning and engagement. To address this challenge, the use of online gamification platforms has increased. In this context, this study explores the effectiveness of Kahoot! for assessment exercises (AE) in higher education. These experiments occurred over three years, included five courses with computer science subjects and had 507 participants. Overall, 97.04% of students achieved a grade higher than ten, and only four failed. The results show that Kahoot! can promote engagement, motivation, and learning outcomes, and its use is well-received by students – 78.70% of students enjoyed this approach, and only 8.68% of participants disliked it. The study’s findings provide valuable insights into using Kahoot! as Student Response System for testing in higher education, with implications for developing new and innovative approaches to assessment and evaluation.

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## 1 Introduction

Assessment is a critical component of the educational process, and the type of tests used is essential to its effectiveness. Traditional pen-and-paper tests are frequently utilised in higher education but have limitations. Engaging students and promoting active learning is a significant challenge. To address this issue, online platforms such as Kahoot! have been developed to provide an interactive and engaging environment for assessment. Online platforms in higher education emphasise the importance of incorporating active learning techniques into teaching to promote deeper understanding and engagement [17]. Active learning has been shown to have numerous benefits, including increased motivation, engagement, and better academic performance [12]. Online platforms like Kahoot! have the potential to facilitate active learning by providing an interactive and engaging environment for assessment.

Although alternatives arise, professors still focus on traditional learning with tests/exams and distrust the efficiency of new approaches/solutions. To solve it, the TechTeach paradigm [17] was created to turn classes more attractive and engaging using emerging techniques and technologies. In this context, some new experiences were performed to overcome the stigma created by online assessments. Using interactive tools (e.g. Mentimeter, VoxVote, Kahoot!, among others) in higher education Assessment Exercises (AE) can result in better engagement, higher motivation, and improved learning outcomes than traditional pen-and-paper tests. AE can include different types, such as tests, mini-tests, or exams.



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## 8:2 A New Approach to Perform Individual Assessments

This study explores a new assessment strategy proposed by professors and evaluates the effectiveness of an online platform – Student Response Systems (SRS) – for higher education AE. The traditional focus of testing students' knowledge with complex questions has shifted to promoting active learning by assessing whether students have assimilated the basics. The goal is to develop students' ability to understand the foundational concepts and enable them to comprehend problems and identify possible solutions. Professors summarise the matter during the test, explaining the answers and highlighting the most critical aspects. The assessment paradigm must change. With the abundance of platforms available, such as Google, Bing, or ChatGPT, professors can focus on teaching students how to find the information they need rather than memorising it.

This new approach was introduced in 2020/2021, and since then, Kahoot! has been used to assess knowledge from over 500 individual AE. These experiments were performed in various courses with computer science subjects, including civil engineering (CIV), Textile Engineering (TEXT), Applied Maths and Statistics (ESTAP), Data Science (DS) and Engineering and Management of Information Systems (EGSI). This work aimed to assess the feasibility of using Kahoot! to evaluate students' knowledge and promote active learning. This article presents the results of several experiments and discusses the implications of the authors' findings for using online platforms in higher education assessment.

This paper is structured into seven sections. The first section, Introduction, presents the goal of the work and the relevant background information. The second section, Background, provides an explanation of some key concepts. The third section, Materials and Methods, outlines the methodologies and tools used in this case study. Forth section presents the approach and gamification rules. The fifth section, Case Study, presents the experiments and results. The sixth section, Discussion, analyzes the results in detail. Finally, the last section, Conclusion, summarizes the study's main findings and provides recommendations for future research.

### **2** Background

This section presents the main topics of the work and some similar works.

#### **2.1 Academic Assessments**

Academic assessments have been an essential aspect of education for centuries, providing a means of evaluating student learning and ensuring that educational goals are being met. Over time, assessment practices have evolved to include a range of methods, including standardized tests, essays, projects, and presentations, among others [4, 5, 19].

However, the traditional approach to assessment has been criticized for its emphasis on high-stakes testing, which can create a culture of fear and anxiety among students and limit their ability to learn and grow. In response, alternative assessment methods that emphasize formative assessment, feedback, and student engagement have been proposed and implemented in various educational settings [5, 9].

One of the emerging alternative assessment methods is using gamification and online platforms, such as Kahoot!, in higher education assessments. These platforms have been found to enhance student engagement, motivation, and learning outcomes and provide instructors with real-time feedback on student performance [10, 6].

As the field of education continues to evolve, assessments will remain an integral part of the learning process. The ongoing development and adoption of innovative assessment practices, including gamification and online platforms (e.g. Student Response Systems), will undoubtedly continue to shape the future of education and improve student outcomes.

## 2.2 TechTeach

TechTeach is a new approach to enhancing student engagement in the classroom by using technology [17]. The authors describe it as combining various digital tools and approaches, such as Gamification, Bring Your Own Device (BYOD), B-learning or project and team-based learning to enhance student engagement. In the context of this work, Gamification and BYOD can be highlighted. Gamification is a different way to assess students, where professors can use the students' actions to give points. BYOD consists of using personal devices (e.g. computer or smartphone) in classes to interact with the subject or do practical exercises. TechTeach suggests that using technology in classrooms can effectively improve education quality and enhance students' learning experience [18].

## 2.3 Student Response Systems

Student Response Systems (SRS), also known as classroom response systems or clickers, are technology-based tools that enable instructors to engage and assess students in real-time during lectures or presentations. These systems allow students to respond to questions or prompts using handheld devices, such as clickers or mobile devices, and the responses are collected and displayed instantly for both the instructor and students to see [7].

## 2.4 Similar Works

Student Response Systems have become increasingly popular in higher education for their potential to facilitate active learning and engagement. One such platform is Kahoot!, a game-based learning platform that allows instructors to create quizzes and interactive activities that students can access via their devices.

Kahoot! has been used in various educational contexts, including primary, secondary, and higher education. In higher education, Kahoot! has been used as a tool for formative assessment, student engagement, and promoting active learning. Studies have shown that Kahoot! can improve learning outcomes and increase student motivation and engagement. [15, 13].

Several studies have evaluated the effectiveness of Kahoot! for testing in higher education. For example, Al-Busaidi et al. [1] evaluated the use of Kahoot! as a formative assessment tool in a medical school course and found that students were highly motivated and engaged with the platform. Similarly, study [16] found several works using Kahoot to engage and assess students. Other studies have compared Kahoot! to traditional pen-and-paper tests. For example, Chiang et al. [8] compared the effectiveness of Kahoot! and pen-and-paper tests in English as a foreign language class and found that Kahoot! resulted in higher scores and greater engagement.

Furthermore, a study by Hunsu and Adesope (2016) [14] conducted a meta-analysis of research on clicker use in higher education and found that clickers positively impacted student engagement, academic achievement, and overall learning outcomes.

While Kahoot! has shown promise as a tool for testing in higher education, it is not without limitations. For example, Kahoot! quizzes are typically short and may not be suitable for more complex topics. Additionally, Kahoot!'s gamification elements may not be appealing to all students.

Other systems similar to Kahoot! have also been used for testing in higher education. For example, Socrative and Quizlet have been used to assess student knowledge and promote active learning [2]. Like Kahoot!, these platforms provide an interactive and engaging environment for assessment.

## 8:4 A New Approach to Perform Individual Assessments

In summary, Kahoot! and SRS have shown potential as tools for testing in higher education. Studies have demonstrated their effectiveness in promoting engagement, motivation, and learning outcomes. However, further research is needed to explore their use in more complex topics and to determine their effectiveness over the long term.

### 3 Material and Methods

This article follows the case study methodology, a qualitative research method involving a detailed investigation of a particular phenomenon or event [20]. The case study methodology typically involves several phases: design, data collection, analysis, and interpretation [3]. The case study consisted in following phases and tasks:

- Design:
  - Creation of the exercise and AE based on the course's learning objectives and curriculum
  - Planning of questions and strategies used in the exercises
  - Definition of rules for calculating grades
  - Design of students' opinion questions to assess their perception of the Kahoot! platform for testing in higher education
- Implementation:
  - Administration of the designed exercise and AE to students using the Kahoot! platform
  - Collection of data on students' performance and grades according to the predefined rules
  - Use of students' opinion questions to assess their perception of the Kahoot! platform for testing
- Analysis:
  - Examination of collected data using various statistical methods, such as descriptive statistics and regression analysis
  - Determination of relationships between students' performance and the Kahoot! platform for testing
  - Analysis of students' opinion responses using thematic analysis to identify any recurring themes or patterns in their feedback [3]
- Interpretation:
  - Interpretation of results to draw conclusions and make recommendations for the use of Kahoot! in higher education testing
  - Comparison of findings with existing literature on the topic
  - Discussion of implications of the results in the broader context of higher education testing

This study follows the case study methodology to provide an in-depth analysis of the use of Kahoot! as an SRS for testing in higher education. By collecting and analyzing data on students' performance and perception of the platform, this study aims to contribute to the growing body of research on the use of online platforms for testing in higher education. The case study methodology is well-suited for exploratory research in real-world settings [11], making it an ideal approach for this study.

### 4 Approach

This section presents the new assessment approach designed (design phase of case study methodology) and then tested with the case study.

## 4.1 Gamification model

The Gamification model enhances a narrative that can be highlighted. It is a key aspect of this approach. The students must know the rules before starting each AE.

1. Students should have previous contact with the tool used (e.g. VoxBot, Kahoot! or other) and must test all question types before the AE start (e.g. short, true or false, multiple choice, among others).
2. All questions must have all details easily identified - question value (bonus), type and timing, left time, number of questions missing, and possible answers.
3. The questions of each AE should only address the fundamentals and essential subjects.
4. Questions must be designed according to the basic knowledge that students must have in their professional work. Subjects that a typical worker needs to use Google or similar should be avoided. However, it must be part of a question if they need to know something before using Google.
5. Each participant can answer the AE using BYOD: smartphone, computer or tablet.
6. The system should incorporate a cut-off value that allows for the exclusion of certain questions. For instance, if the percentage of correct answers to a particular question is low, it indicates that the question may be poorly formulated or that the professor may have been ineffective in explaining the corresponding content. In such cases, the final assessment should not include the question.
7. The Evaluation criteria should consider quickness and rightness. Each question is timed, so if a student answers with a response time inside of Q3 answers time, he receives 100%; otherwise, he receives a percentage according to the average time
8. If a question is relevant, it should have double points (200%)
9. Quick students with correct answers (higher than the average) can receive a bonus.
10. The question's time varies according to the typologies and complex level.
11. In case multiple answers are allowed, if students hit at least 50% of cases, they receive some points; otherwise, they have 0.

The professor can add or consider different ideas; however, they must be explained at the beginning of the subject.

## 4.2 Rules

The guidelines for the assessment exercise were developed as part of the TechTeach paradigm and considered a set of specific factors, including

- **Type of questions:** true and false; multiple choice; short answer; ordering
- **Time limited:** 10s, 30s, 60s, and 90s
- **Valuation:** normal and double
- **Knowledge:** essential and must have
- **Evaluation criteria:** quickness (quartiles and average time), rightness
- **Types of exercises:** simple and quick questions, code with variables or images.
- **Questions number:** 25-30 (a ratio from each matter taught) - Many questions allow crossing all matters addressed and show if students know all the basics.

This approach evaluates critical knowledge, and the AE class can be used for reviewing purposes. After the students answer each question, the professor should explain the question and respective answers to the class, ensuring that the key knowledge of the subject is not forgotten.

Strategies like questions with short time, bonuses and others can be used to avoid copy. Students are instigated to answer quickly with their knowledge; otherwise, time elapses, and they will not respond on time.

## 8:6 A New Approach to Perform Individual Assessments

A case study was designed and implemented to test this approach over the last three years.

### 5 Case Study

This case study started in 2020 and followed some TeachTeach guidelines [17], including gamification [18] and bringing your own device (BYOD), which was presented in Section 4. Since 2020, 507 students participated in this study and used Kahoot! to perform their exercises. The study was applied in several subjects(courses), including:

- **Introduction to Programming**
  - Courses: Civil, Textile, Applied Statistics and Maths, Data Science
  - Academic Year: 1st
- **Web Programming**
  - Course: Information Systems
  - Academic Year: 2nd and 3rd

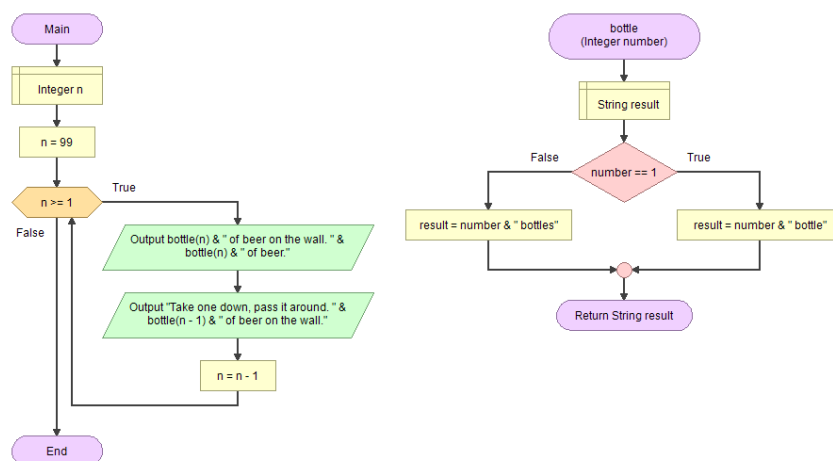
#### 5.1 Implementation

The following list presents the implementation phase and shows some questions that exemplify the rules explained in section 4.2. The list includes the question, its type, the defined answering time, and the available answer choices.

(A) **Question:** What is the “not equal to” symbol in Em Gaddys?

- **Question type:** short answer
- **Time-limited:** 30 sec
- **Solution:** <>

(B) **Question:** Which of the following loops (figure 1) is a “while” loop?



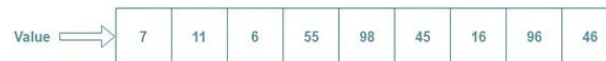
■ **Figure 1** Example of While Loop and IF.

- **Time-limited:** 30 sec
- **Question type:** Quiz
- **Answers:**
  - (a) A
  - (b) B
  - (c) None of the above

(C) **Question:** What does a compiler do?

- **Time-limited:** 30 sec
- **Question type:** Quiz
- **Answers:**
  - (a) Translates the source code instructions into Assembly language instructions
  - (b) Translates Assembly language instructions into corresponding binary code
  - (c) Prepares the object code to be loaded into memory and executed
  - (d) Examines, decodes, and executes each instruction of the source code line by line

(D) **Question:** What is the value of a[5] in figure 2?



■ **Figure 2** Example of array.

- **Question type:** Type answer
  - **Time-limited:** 30sec
  - **Solution:** 45
- (E) **Question:** How many columns does Bootstrap's grid system have?
- **Question type:** Type answer
  - **Time-limited:** 20 sec
  - **Possible Solutions:**
    - (a) 12
    - (b) twelve
    - (c) Twelve
- (F) **Question:** Order the following options in order to validate the code of figure 3

```

window.onload = pageLoad;

//chamado quando a página termina de ser carregada; sets up event handlers
function pageLoad() {
  var computeButton = document.getElementById("compute");
  computeButton.onclick = compute;
}

// Multiplies two numbers typed into input boxes on the page,
// and displays the result in a span on the page.
function compute() {
  var A = document.getElementById("num1"); //fetch the 2 numbers
  var input2 = document.getElementById("num2");
  var B = document.getElementById("answer");
  var C = input1.value * input2.value; // compute result
  answer.D = result;
}

```

■ **Figure 3** An example of code with missing details.

- **Question type:** Ordering
- **Time-limited:** 90sec

  - (a) input1
  - (b) answer
  - (c) result
  - (d) innerHTML

### 5.2 Analysis of the results

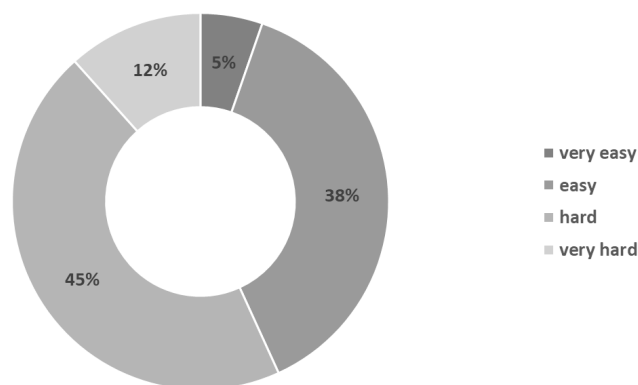
During the case study, which started in the academic year 2020/2021, seven distinct exams were conducted using Kahoot! the platform for testing in higher education. These exams were administered in multiple courses. 2020/21 was the team’s first year in this subject, and the team started by experimenting with this approach, so it was not possible to compare the results with traditional methods (pen & paper) yet. Regarding the results, three types of performance data were evaluated: quickness, rightness, and exercise relevance. The quickness of the students’ responses was measured using quartiles and average time, while rightness was calculated based on the number of correct answers. The exercise relevance was classified as a normal or double point.

In this case study, a cut-off was defined, i.e., the lower number of correct answers to each question ranged between five and twelve per cent. So, questions where the number of rightness was lower than the cut-off were removed.

To understand students’ opinions about this evaluation approach, the two last questions of each EA are

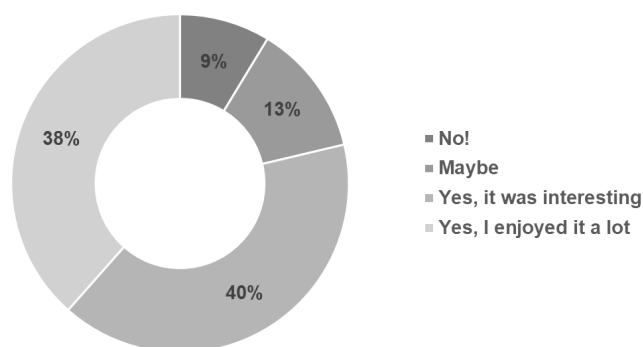
1. Q1 – How challenging was the examination?
2. Q2 – Did you approve this model?

Figure 4 depicts students’ opinions about the difficulty of the exam. As observed, more than 50% of the students considered it hard or very hard.



■ Figure 4 Q1 – How challenging was the examination?

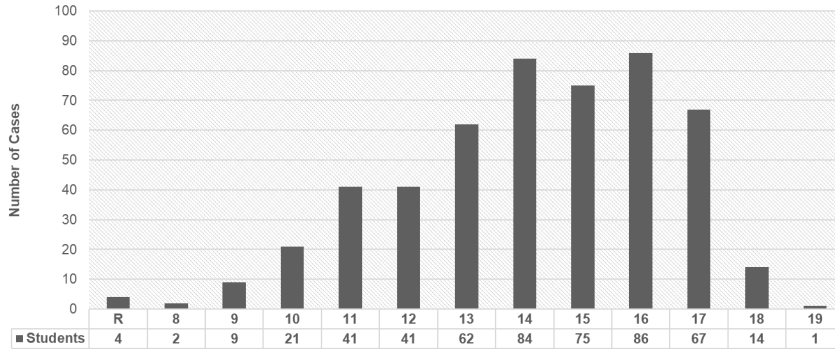
Figure 5 illustrates the students’ approval of this exercise model. Of the total number of students surveyed, 78 approved of this model, while only 9 did not want this type of exercise.



■ Figure 5 Q2 – Did you approve this model?

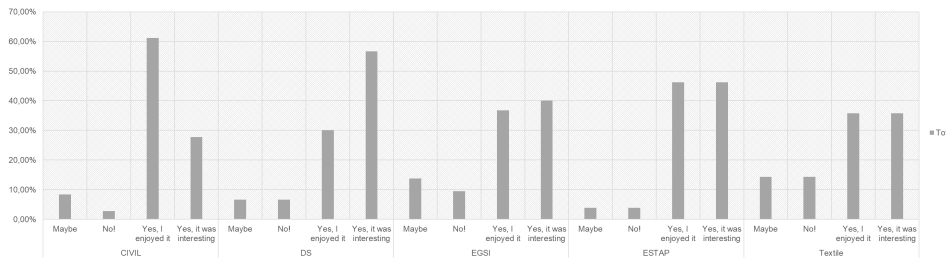


The following image (Figure 6) shows the distribution of student grades. As can be observed, this method resulted in only four students (0.78%) failing (grade R) and 2.96% receiving a negative rate of less than 10. Furthermore, the results indicate that this method efficiently avoids too high grades. Conscientious, we can understand that none of the students can know everything a professor teaches, so they hit answer all the questions. So, only 15 students (2.96%) achieved a grade between eighteen and twenty.



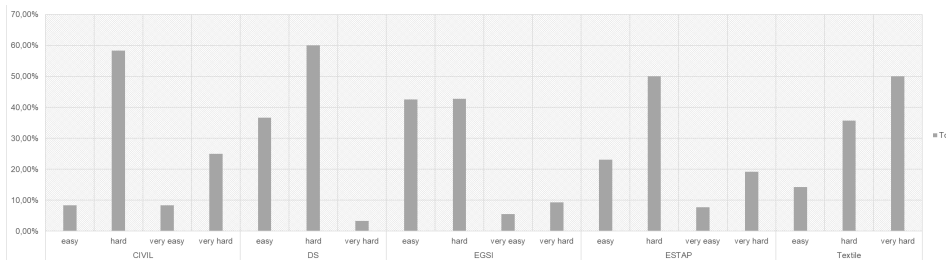
■ **Figure 6** Results distribution.

Another interesting analysis pertains to students' perceptions of the assessment exercises (figure 7), broken down by course. While generally, all courses expressed approval of this approach, certain courses such as CIVIL (>60%) demonstrated the highest level of approval (i.e., 'Yes, I enjoyed it')



■ **Figure 7** Approved opinion By Course.

The same analysis can be performed based on students' perceptions of the difficulty of the assessment exercise (Figure 8). Overall, the assessment exercise was perceived as difficult or very difficult by the students across all courses, with a minimum of 50% of students rating it as such.



■ **Figure 8** Difficulty perception by Course.

## 8:10 A New Approach to Perform Individual Assessments

Another potential avenue for further research is using pivot tables to analyze and compare students' opinions and grades across different courses.

Figure 9 presents the minimum (min), maximum (max), and average grades grouped by students' approval of the approach and their perception of the AE difficulty. This figure crosses user expectations, perceptions and the achieved results. For instance, in the Civil course, students who enjoyed the AE and found it challenging achieved grades ranging from 8.30 to 15.18. Students who enjoyed the mechanism but considered it difficult could achieve good grades.

In another analysis, EGSI students who may approve this mechanism and consider the exam easy had a minimum grade of 9,18 and a maximum grade of 17,03 with an average of 14.07. Globally, those who considered the AE easy achieved better grades than others.

Curiously, some students who enjoyed the mechanism did not achieve positive grades, which means the agent is correct, but they must study more to achieve better results.

This analysis can provide valuable insights into the relationship between students' opinions, perceived difficulty, and their academic performance in different courses.

Row Labels	Min of RESULT	Max of RESULT	Average of RESULT
<b>CIVIL</b>	<b>8,30</b>	<b>15,18</b>	<b>11,84</b>
<b>Maybe</b>	<b>11,38</b>	<b>12,81</b>	<b>12,12</b>
hard	11,38	12,81	12,10
very hard	12,16	12,16	12,16
<b>No!</b>	<b>12,67</b>	<b>12,67</b>	<b>12,67</b>
very hard	12,67	12,67	12,67
<b>Yes, I enjoyed it</b>	<b>8,30</b>	<b>15,18</b>	<b>11,83</b>
easy	10,99	13,32	12,37
hard	8,30	15,18	11,75
very easy	10,78	12,74	11,84
very hard	8,82	14,11	11,66
<b>Yes, it was interesting</b>	<b>9,40</b>	<b>14,45</b>	<b>11,68</b>
hard	9,40	14,45	11,76
very hard	11,27	11,47	11,37
<b>DS</b>	<b>10,63</b>	<b>17,61</b>	<b>14,41</b>
<b>Maybe</b>	<b>12,67</b>	<b>14,30</b>	<b>13,48</b>
hard	12,67	14,30	13,48
<b>No!</b>	<b>14,48</b>	<b>14,93</b>	<b>14,71</b>
easy	14,48	14,93	14,71
<b>Yes, I enjoyed it</b>	<b>10,63</b>	<b>16,58</b>	<b>14,07</b>
easy	12,31	12,31	12,31
hard	10,63	16,58	14,28
<b>Yes, it was interesting</b>	<b>11,19</b>	<b>17,61</b>	<b>14,66</b>
easy	12,93	17,61	15,22
hard	11,93	17,32	14,54
very hard	11,19	11,19	11,19
<b>EGSI</b>	<b>8,81</b>	<b>18,43</b>	<b>14,56</b>
<b>Maybe</b>	<b>9,78</b>	<b>17,03</b>	<b>13,92</b>
easy	9,78	17,03	14,07
hard	10,36	16,79	13,72
very easy	13,26	16,94	15,87
very hard	11,51	14,55	12,84
<b>No!</b>	<b>8,96</b>	<b>17,32</b>	<b>13,09</b>
easy	10,10	17,32	13,53
hard	9,07	16,41	12,96
very easy	15,53	15,53	15,53
very hard	8,96	16,82	12,93
<b>Yes, I enjoyed it</b>	<b>8,81</b>	<b>17,93</b>	<b>15,08</b>
easy	9,72	17,89	15,27
hard	10,71	17,93	14,61
very easy	14,65	17,47	16,66
very hard	8,81	17,26	14,30
<b>Yes, it was interesting</b>	<b>8,83</b>	<b>18,43</b>	<b>14,64</b>
easy	8,83	18,26	15,05
hard	9,29	17,62	13,95
very easy	16,71	18,43	17,39
very hard	11,86	17,32	15,00

Row Labels	Min of RESULT	Max of RESULT	Average of RESULT
<b>CIVIL</b>	<b>8,30</b>	<b>15,18</b>	<b>11,84</b>
<b>DS</b>	<b>10,63</b>	<b>17,61</b>	<b>14,41</b>
<b>EGSI</b>	<b>8,81</b>	<b>18,43</b>	<b>14,56</b>
<b>ESTAP</b>	<b>8,33</b>	<b>15,37</b>	<b>12,63</b>
<b>Maybe</b>	<b>12,63</b>	<b>12,63</b>	<b>12,63</b>
hard	12,63	12,63	12,63
<b>No!</b>	<b>13,31</b>	<b>13,31</b>	<b>13,31</b>
very easy	13,31	13,31	13,31
<b>Yes, I enjoyed it</b>	<b>10,62</b>	<b>15,37</b>	<b>12,91</b>
easy	14,45	15,37	14,91
hard	10,74	14,70	12,43
very easy	14,15	14,15	14,15
very hard	10,62	12,97	12,13
<b>Yes, it was interesting</b>	<b>8,33</b>	<b>14,34</b>	<b>12,29</b>
easy	11,81	14,34	12,90
hard	8,33	13,80	11,39
very hard	13,35	14,21	13,78
<b>Textile</b>	<b>10,18</b>	<b>18,78</b>	<b>12,86</b>
<b>Maybe</b>	<b>14,56</b>	<b>14,56</b>	<b>14,56</b>
very hard	14,56	14,56	14,56
<b>No!</b>	<b>10,64</b>	<b>10,64</b>	<b>10,64</b>
hard	10,64	10,64	10,64
<b>Yes, I enjoyed it</b>	<b>10,37</b>	<b>18,78</b>	<b>13,72</b>
easy	13,43	18,78	16,10
hard	13,18	13,18	13,18
very hard	10,37	12,84	11,60
<b>Yes, it was interesting</b>	<b>10,18</b>	<b>14,25</b>	<b>12,10</b>
hard	11,18	12,07	11,62
very hard	10,18	14,25	12,43
<b>Grand Total</b>	<b>8,30</b>	<b>18,78</b>	<b>14,22</b>

■ **Figure 9** Students grades by opinions.

## 6 Discussion

The case study results provide valuable insights into the use of Kahoot! as a Student Response System for testing in higher education. In the interpretation phase, it was observed that these findings could inform the development of new and innovative approaches for assessment and evaluation in this context, contributing to ongoing efforts to improve the quality of education and student learning outcomes.

Naturally, non-technical courses, such as DS, ESTAP, and Textile, rated the assessment exercise as challenging (hard or very hard), which is understandable given their knowledge base in non-computing subjects. It ranged from 63.33% at DS and textile at 85.71%. The students still approved the assessment exercise as a valid test mechanism. Interestingly, EGSI students had varying opinions, with 42.50% rating the assessment exercise as easy and 42.75% rating it as hard.

Furthermore, students' opinions about the difficulty of the AE had little impact on their results. For instance, some students who found it hard achieved good results, whereas some who found it easy achieved lower results. However, better results were achieved by students who approved of this approach.

Most students highlighted the importance of explaining each question after their end. According to them, it allowed them to understand what they failed and improve their understanding of the subject matter.

Overall, the study's results were very positive, with 97.04% of the students achieving a grade higher than ten and only 4 out of 507 failed. Globally, the students approved the assessment exercise, with a 78.70% approval rating, and only 8.68% of participants disliked it.

## 7 Conclusion

The study demonstrates the effectiveness of Kahoot! as an SRS for assessment exercises in higher education. The use of Kahoot! resulted in high levels of student engagement, motivation, and learning outcomes. The majority of students achieved a grade higher than 10, with only 4 out of 507 failing. Additionally, 78.70% of participants approved the approach, while only 8.68% disapproved. This high approval rate suggests that students found the use of Kahoot! to be a valuable and effective tool for testing in higher education.

The results of this study have important implications for the development of new and innovative approaches to assessment and evaluation in higher education. Kahoot! and other gamification platforms have the potential to transform traditional methods of assessment, promoting active learning and engagement. The findings of this study also highlight the importance of providing students with real-time feedback and explaining the correct answers after the assessment exercises, which can improve their understanding and performance.

By incorporating interactive and engaging assessment exercises like Kahoot! into their teaching practices, instructors can promote active learning and provide students with a more engaging and rewarding educational experience. The study can help professors interested in adopting a game-based learning platform in their teaching practices.

This experiment will continue in the future, and distinct types of questions will be added to further explore the potential of Kahoot! and other gamification platforms in higher education assessment. Further, this approach will also be compared with other existing and having the same goal and explored using different tools. Finally, the team will explore the possibility of comparing results using digital with non-digital methods.

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