INTERNATIONAL SEVEN JOURNAL
OF MULTIDISCIPLINARY
ISSN: 2764-9547

The use of the Kahoot application in teacher education and science teaching

O uso do aplicativo Kahoot na formação de professores e ensino de ciências

DOI: 10.56238/isevmjv1n1-003
Receiving the originals: 02/02/2023
Acceptance for publication: 24/02/2023

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ABSTRACT

In contemporary times, the so-called Information Society progressively forces us to walk in new directions, that is, we are changing our lives and activities due to the technological world. Such changes have reached schools, especially classrooms, which have been undergoing transformations to keep pace with the new Digital Information and Communication Technologies (ICT). In this wave came the applications called Apps, which have several features. Among them, we have Kahoot, which is an application that makes use of gamification to promote and evaluate learning. This research is qualitative in nature and its objective is to verify the use of the Kahoot application for science teacher training, and also to verify the efficiency of teaching chemistry, physics, and biology through this application. The results showed that Kahoot is effective in the teaching-learning process; however, it is necessary to have more investment policies for teacher training and further research in this area.

Keywords: Teaching, Science, Training, Kahoot.

1 INTRODUCTION

The use of the so-called Digital Information and Communication Technologies (ICT) has brought to society profound changes in thinking about education, especially now in times of the COVID-19 pandemic, especially due to access to information and forms of communication that today are faster and more synchronous. The introduction of the Kahoot application in education: Checking students' knowledge in real time on the computer and the advances driven by the Internet have undoubtedly been decisive for all these changes to take place. Mobile devices (tablets, cell phones, notebooks) and computers connected to the Internet have made access to the web increasingly easy. They have also brought endless possibilities to their users, one of them being mobile learning, which is learning anywhere and anywhere, going beyond the classroom walls, making access to teachers and students faster. The expansion of access to mobile devices around the world has promoted changes in the production and sharing of knowledge and presenting multiple possibilities for learning, based on the mobility of devices, students, content and access

to knowledge anytime and anywhere (Melo & Neves, 2015). From the emergence of the most modern devices with Internet access, several applications (also called Apps) began to appear on the market, offering varied services, from saving important information, paying bills and facilitating communications. These resources can also become an important tool to assist people in the teaching and learning process. Carvalho (2015) identified the main advantages of mobile devices, among them: the possibility of being used anywhere; the startup time of the devices is faster than in conventional computers; the need for neither keyboard nor peripherals to use the devices; requirement of less maintenance than traditional computers and laptops; and, if well employed, can even stimulate the concentration of students, improving behavior. However, the same author also highlights some disadvantages, such as: the possibility of disruptive behavior; the impossibility of viewing certain content, especially in formats not supported for mobile devices; the insufficient screen size in certain models of mobile devices. In this sense, this article seeks to give an overview of the Kahoot application as a teaching learning tool and its interactions with students favoring the teaching learning process in real time. Besides being a free tool, the classes become more dynamic and interactive, provoking, through tasks and challenges, more interactivity among the students and facilitating the teacher's evaluation of the content. Kahoot! opens a range of possibilities for the development of activities in various areas of knowledge. According to Costa & Oliveira (2015, s/p):

> The teacher can use Kahoot! in many ways, everything will depend on his or her educational goals. It is a good tool for discussion where students can vote on, for example, ethical issues anonymously. It is also a tool for summarizing a topic in a fun, interactive and engaging way. Another way to use Kahoot! is to investigate students' knowledge of content covered in class.

Kahoot offers four activity modes (Quiz, Jumble, Discussion and Survey), but the most commonly used mode for educational purposes is Quiz. The latter allows the creation of multiple choice questions, which are timed and a score attributed to the correctness and response time of the users. After creating the questions and configuring Kahoot, the teacher will log into his/her classroom account and project the questions for students to view. This paper presents a literature review of the application of the kahoot tool, particularly in the last 5 years, of the implementation of its use for science teacher training and for verification of classroom teaching in high school and college in the sciences. Physics, chemistry, and biology have concepts that are often abstract and that often escape common sense. In this sense, the Kahoot application seeks to make the activity more interesting for the students, besides being a facilitator for the teacher in the classroom.

2 METHODOLOGY

This work is a qualitative research, whose data will be analyzed through Content Analysis (CA) from Bardin's perspective. About the CA Bardin (2016, p.37) tells us that it is about:

> A set of techniques for the analysis of communications. It is not a single instrument, but a range of tools; or, more accurately, it will be a single instrument, but marked by a great disparity of forms and adaptable to a very wide field of application: communications.

In this sense, the search was conducted in Google Scholar using the descriptors: "Kahoot" teaching science chemistry physics biology for the years 2016 to 2020. A total of 214 papers were found and, after a floating reading and a new selection, we reached the articles that address science teaching and teacher training. The results of the search are described in table 1.

Table 1: Selected research articles on the use of the Kahoot application in science education and training

YEAR	AUTHORS	TITLE
2020	DA MATTA, Luciana Duarte Martins et al.	TEACHING AND LEARNING OF BIOMOLECULES IN EDUCATION MEDIUM: EXTRACTION OF WATER AND STIMULUS EXPERIMENTATION
2020	DA SILVA, André Coelho FORTUNATO, Ivan	GAMIFICATION APPLIED TO THE INITIAL TRAINING OF PHYSICS TEACHERS IN THREE METHODOLOGICAL OPTIONS
2020	JACQUES, Pedro Henrique Mirapalheta et al.	INNOVATIVE METHODOLOGIES AT DEVELOPMENT OF PEDAGOGICAL MATERIAL FOR TEACHING CHEMISTRY
2020	FEITOSA, Robério Rodrigues	THE USE OF THE KAHOOT AS A TOOL PEDAGOGY IN SCIENCE CLASSES: THE FOCUS ON HYBRID TEACHING
2020	JUNIOR, Pedro Donizete Colombo et al.	INITIATION TO TEACHING IN PHYSICS AND THE QUESTIONS OF BASIC EDUCATION STUDENTS - A REPORT
2019	PERSICH, Gracieli Dall Ostro	VIRTUAL GAME AS A TOOL FOR TEACHING-LEARNING CYTOLOGY IN HIGH SCHOOL
2019	DANTAS, Arlinda Pereira et al.	USE OF TECHNOLOGY IN THE CLASSROOM: KAHOOT AS A TOOL FOR TEACHER TRAINING AT THE UNIVERSITY OF PERNAMBUCO-UPE/ CAMPUS GARANHUNS
2018	CAVALCANTE, Artur Araújo et al.	DIGITAL TECHNOLOGIES IN PHYSICS TEACHING: AN EXPERIENCE REPORT USING *KAHOOT* AS GAMIFIED ASSESSMENT TOOL
2018	LADISLAU, Marcos Tulios Frota et al.	KAHOOT AS A DIGITAL TOOL FOR TEACHING: APPLICATION IN ORGANIC CHEMISTRY
2018	SILVA, João Batista da et al.	GAMIFICATION OF A DIDACTIC SEQUENCE AS A STRATEGY TO MOTIVATE STUDENTS' POTENTIALLY MEANINGFUL ATTITUDE IN OPTICS TEACHING GEOMETRIC

2017	ANDRADE, Giseli Trento et al.	INTEGRATION OF TECHNOLOGIES, ACADEMIC PROTAGONISM AND THE CONCEPTION OF A NEW HIGH SCHOOL AT SENAI DE SANTA CATARINA
2017	COSTA, DANTAS & MOITA	MARVINSKETCH AND KAHOOT AS TOOLS FOR TEACHING ISOMERY

Source: table prepared by the authors

Also according to Bardin (2016, p. 137) the unit of Context:

> It serves as the unit of understanding to encode the unit of record, and corresponds to the segments of the message whose dimensions (greater than those of the unit of record) are optimal for understanding the exact meaning of the unit of record.

The readings of the articles selected in the research gave rise to the following Unit of Context: 1) The use of kahoot for teacher training and teaching chemistry, physics and biology. After exhaustive reading of the selected articles, we performed Categorization which is defined by Bardin (2016, p. 147) as:

> An operation of classification of elements constituting a set by differentiation and then by regrouping according to gender (analogy), with the criteria. Categories are headings or classes, which bring together a group of elements (units of record, in the case of content analysis) under a generic heading, grouped because of the common characteristics of these elements.

The categories originated from the studies and analysis of the selected articles are: 1.1) Research proposal; 1.2) Research locus; 1.3) Geographic regions; 1.4) Application effectiveness. Each of the categories will be presented in the next topic.

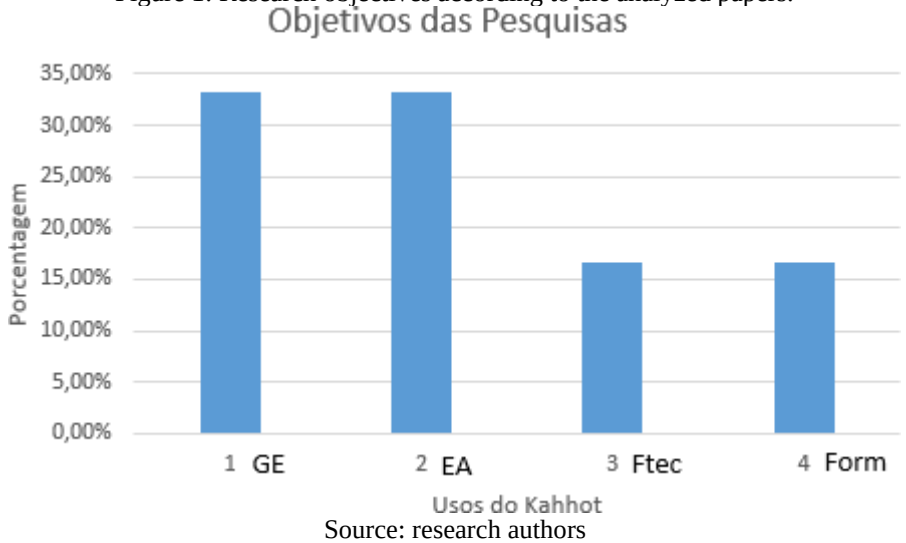
3 RESULTS AND DISCUSSIONS

Table 1 shows the publications of scientific articles using the Kahoot application found in Google Scholar on the use of this application for science teacher education and the teaching of chemistry, physics and biology. Twelve articles were selected that met the research criteria. The context unit: 1) The use of kahoot for science teacher education and the teaching of chemistry, physics and biology gave rise to the categories: 1.1) Purpose of the research; 1.2) Locus of research; 1.3) Geographical regions; 1.4) Effectiveness of the application. We will now analyze each of these categories.

3.1 RESEARCH PROPOSAL

This category aims to present the proposals of the 12 selected articles for the Kahoot application in teacher education and teaching of chemistry, physics and biology. Figure 1 shows the prevalence of the proposals presented in the articles.

Figure 1: Research objectives according to the analyzed papers.



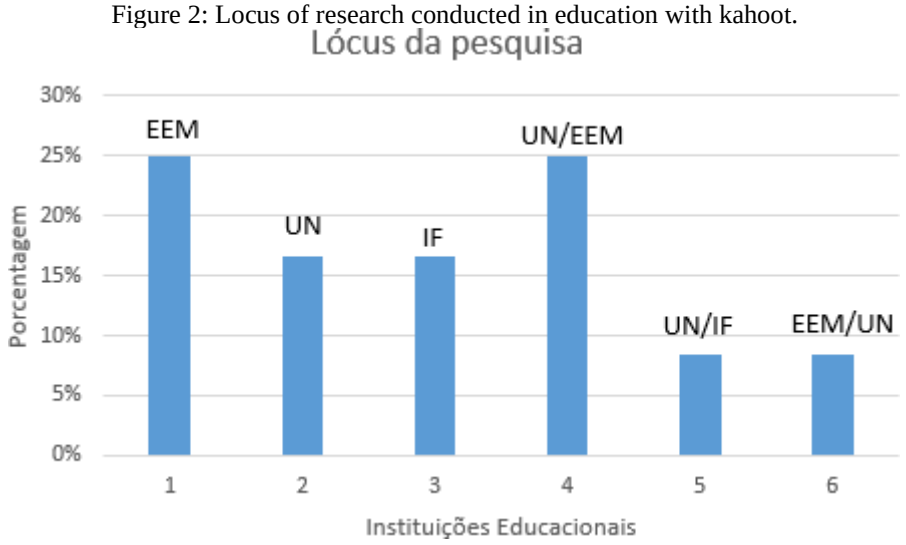
Source: research authors

Figure 1 presents the propositions observed in the 12 research studies on the use of kahoot in education. Through this analysis, we conclude that there was a balance between columns 1 and 2, corresponding to Teaching Gamification (TE) and Teaching Learning (TE). This means that of the total number of papers analyzed, 33.33% said that the intention of the study is to verify the usefulness of Gamified Teaching (GE) with the use of kahoot against the proposed objectives. The other 33.33% said that their intention was to see the application's usefulness for students' Teaching Learning (TE). In columns 3 and 4 we had the same percentage, that is, 16.66% wanted to investigate the use of kahoot as a Technological Tool (Ftec) and 16.66% to investigate the use of this application in the training (Form) of science teachers.

3.2 LOCUS OF RESEARCH

This category emphasizes research using kahoot in education conducted by high schools, universities, federal institutes and in partnership between these institutions, i.e., University/High School (BU/High School); University/Federal Institute (BU/FI); High School/University. Figure 2 shows the percentage of these researches carried out in these educational institutions.

Figure 2: Locus of research conducted in education with kahoot.



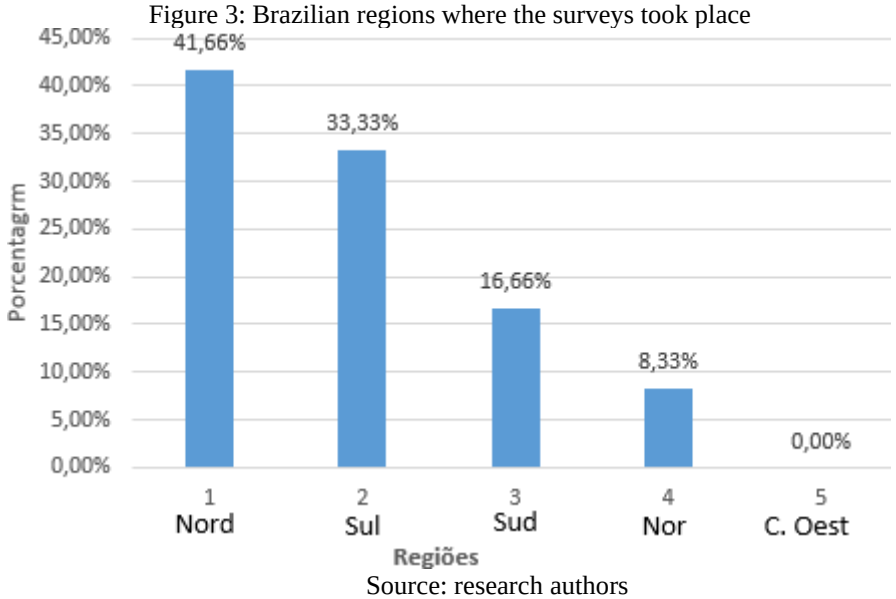
Source: research authors

According to the data analysis in figure 2, 25% of the research was conducted in high schools (EEM) and the other 25% by the University/High School (UN/EEM) represented in columns 1 and 4. 16.66% of the research was done by the partnership between public universities and federal institutes (columns 2 and 3). The lowest percentage refers to kahoot for research conducted by the duos universities/federal institutes (UN/IF) and high school/universities (EEM/UM) which reached the percentage of 8.33% each for columns 5 and 6.

3.3 GEOGRAPHICAL REGIONS

We will present in this category where these surveys took place, that is, in which Brazilian regions. Figure 3 shows us the results.

Figure 3: Brazilian regions where the surveys took place



Source: research authors

As shown in figure 3, 41.66% (column 1) of the research on the use of kahoot in teaching was done in the Northeast region; 33.33% in the South region (column 2); 16.66% in the Southeast region (column 3); 8.33% for the North region. We did not find in our search, through the descriptors used, any research on the use of Kahoot for teacher training or for the teaching of science, chemistry, physics and biology in the Midwest region.

3.4 APPLICATION EFFECTIVENESS

We intend to show in this category the degree of efficiency of the kahoot application against the objectives outlined in each scientific article selected in the research.

When revisiting all the selected works in this research, we obtained a percentage of 83.33% of educators who were successful in their school activities when using the Kahoot application. A percentage of 16.66% said that the activities with the app partially met the proposed pedagogical objectives. Calvalcante et al. (2018) recognize the potential of the Kahoot app for the teaching-learning process, but point out the need for teacher knowledge in the use of this gamified tool as an evaluative instrument. Da Matta et al. (2020), on the other hand, see that in practical assessment activities where students were assessed in an easy way, without contextualized definitions, the desired objectives were met; however, in situations that involved a greater degree of interpretation and understanding, these objectives were not met to their satisfaction. According to Da Matta et al. (2020), this situation can be explained by: "Such students are mere receivers of information, perhaps using memorization, which does not generate knowledge in fact, because they cannot apply it, nor relate it.

4 FINAL CONSIDERATIONS

The Kahoot application used in the research for both Gamification of Teaching (GE), Teaching Learning (TE), Technology Tool (Ftec) and Science Teacher Training, proved to be efficient for the proposed objectives; however, the use of this application is still small in the area of education. Furthermore, it was observed that its use will increase in 2020 with the arrival of remote learning triggered by the COVID 19 pandemic. We did not find any research on the descriptors proposed for the use of Kahoot in the Midwest region.

It was clear in the research that there is also a lack of training for teachers in the development of more creative, dynamic classes, involving their curricular component through these applications.

We still have to advance in new research, as we observe a limited number of these, reformulation of the curriculum, improvement of the infrastructure, especially in basic schools, so that these methodologies can reach all students, from basic education up to higher education, and contribute to the improvement of teaching at all levels.

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