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ORIGINAL RESEARCH

Technology and learning-oriented feedback assessment: A case study in medical education

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Abstract

Objective: Present study aimed to explore the Kahoot platform as a technology for feedback-driven evaluation in medical education

Materials and Methods: Three focus groups including undergraduate and dental students were formatively evaluated using the Kahoot platform, during two semesters include at least three exams. Students participated in the scheduled exam using a special code. The answer immediately was shown and the teacher was able to provide oral and textual explanations and even upload slides if there was any ambiguity in the answer. To evaluate the platform efficiency, a standardized 12-item questionnaire was provided. Data analysis was conducted using descriptive statistics.

Results: Kahoot made the exam more pleasant and reduced stress (97%). It was an effective way to learn more accurately and deeply regarding feedback and reflective learning (91.4%). Providing feedback, created better environment learning than traditional learning (88.6%). Motivate to learn more (88.5%) and focus on the subject (84.7%) were other results.

Conclusion: Kahoot platform can facilitate students' perceptions about their educational weaknesses. Deeper learning takes form by interaction with the teacher and the weaknesses are eliminated. This process can create a test-learning bridge by making evaluation enjoyable and targeting the two together. So, it's a promising tool for formative assessment in medical education.

Keywords: Kahoot platform; Formative assessment; Feedback-oriented exam; Evaluation technologies; Test-learning

Introduction

The rise of information and communication technologies caused the world has entered a new era, called information society. The educational system is one of the important societies guiding elements which plays an important role in providing human capital and educating them. This requires a review of educational policies, strategies, and the replacement of new assessment methods with traditional ones. A large amount of information available and lack of time for faculty, research scholars, and students highlight the need for these methods.

Assessment of learners' performance is based on educational goals. There are two main types of learners' performance assessment: formative assessment and summative assessment. The summative assessment occurs at the end of a given learning period and requires judgment on the learning process that has taken place. Formative assessment is designed to provide feedback on performance to improve and accelerate learning (1-4). Formative assessment is effective when it is included in teaching and learning activities to facilitate the provision of timely and continuous feedback to learners (5). It should be designed to improve and enhance learners' understanding of educational topics. This type of assessment can be performed in different ways such as written tests or online tests (3). Formative assessment is increasingly emphasized in universities and should be considered as an important element in facilitating the learning process (3, 4).

Today, game-based learning has become more common in education. Most related research papers show that play-based learning has been more effective than traditional learning (2, 4, 6, 7). In terms of student performance, research has shown that students whose learning is based on play are significantly better than students who learn using traditional methods (6, 8). Also, it was revealed that play-based learning can improve their motivation (6, 9), enhance interaction with learning (10, 11), and provide them with more effective feedback (12-14). The fourth industrial revolution led to the development of new evaluation methods, which apply game-based learning theories including online platforms such as Kahoot, Quizzes, Quizzets, etc. These platforms are widely used as formative assessment tools to promote learners' learning (4). Kahoot is a real-time platform for game-based learning. It is a free formative assessment tool that is widely used in education. According to available reports, Kahoot has 51 million games on its platform, which is used by more than 30 million users worldwide (12).

Different level of students is one of the teachers' problems. Kahoot allows instructors to create four different types of game-based educational content, including quizzes, polls, debates, and discussions in which participants compete with each other. Kahoot helps instructors; because, students who are weak in learning participate in the competition, and the educational topics along with the game are interesting to them. Those who are ahead enjoy one of the most attractive features of this system, which is the calculation of the speed of response in the points earned, as well as the possibility of participating in public competitions. The top respondents are shown after answering, and at the end of the test, the final winner is displayed among the participants based on ranking (2, 13), and in this way, maximum participation of students reached. In this system combination of practice and play lead to increasing students' practice. Other benefits of Kahoot are: the ability to quickly evaluate, review quickly and conceptually the lesson of each session, increase students' speed in solving problems, eliminate the possibility of cheating students, access to several formats (tests, questions, discussions or reviews), register information of each test in the memory of the organizer account, usability for several times, free Kahoot platform, usability on smartphones, tablets, and computers, use of music and colorful images, and flexibility of response time. In addition, instructors can download, review and store results to analyze student performance (2, 4). Considering the advantages of this tool and its capabilities in performing rapid and accurate formative assessment and subsequent feedback, the purpose of designing and implementing this process is to use Kahoot as a formative assessment tool in medical science education.

Materials and Methods

Research design

The study was designed with the quantitative research approach .Quantitative study data were collected with an experimental process. the study data were analyzed and associated by responding to the research question.

Participants and setting

In this descriptive-analytical study, 105 students in three fields including dentistry (60 students), bachelor of public health (30 students), and bachelor of health information technology (15 students), from Hormozgan University of Medical Sciences were formatively evaluated using the Kahoot platform. The evaluation was performed during two semesters. In each semester, at least three Kahoot tests were held for each of the mentioned fields. About each field of dentistry, public health, and health information technology, two theoretical units of lessons including health services management, management, and supervision of health centers and the principles of planning in health and, insurance and payment systems were tested, respectively.

Program implementation

Students downloaded the Kahoot software from Google Play or the App Store, which of course access to this software is free. If students were not able to use the software, they were able to access the environment through the website platform. Necessary explanations were given about the purpose of software and how it works, and a pilot exam was held for each of the mentioned groups. It is worth mentioning that any kind of question can be designed in the environment of this software. The exam was designed in Kahoot environment and appropriate time was considered between 5 and 240 seconds. When starting the exam, a special code was created by Kahoot. The teacher provided code to students to enter the exam environment and announced the start of the exam after all students entered the exam environment. The exam could also start whenever he or she wishes; For example, when the number of participants reached 10 or when 5 minutes passed since the announcement of the code. The questions were displayed in sequence with the response time. After answering each question, students received the result of their answers immediately. The instant feedback is one of the benefits of using this software that can lead to re-learning. If the student's answer was incorrect or further explanation was needed about the question, it was possible to correct the students' ambiguity or error in the question through oral or textual explanation or even uploading slides. These steps continued until the end of the exam. After completion of the answers, students could immediately receive a total evaluation score as well as individual questions. They also ranked among the participating students. All evaluations made in the instructor’s user environment were saved in detail, including students' information and how questions were answered. It could be retrieved and accessed at any other time.

Data collection and evaluation

To evaluate the results for students' formative evaluations, the standardized questionnaire was used consisting of 12 questions on a Likert scale (4). The questionnaire was completed by students after holding the last developmental evaluation exam. Descriptive statistics were used to analyze data by SPSS software version 21.

Results

A total of 105 students participated in this study. The majority were female (71.4%). The participants included dental students (57.1%), health students (28.6 %), and paramedical students (14.3%). According to the results, Kahoot played an important role in effective education by making learning fun (97%), providing feedback and more learning (91.4%), and reflective learning (91.4%). Focusing on the topic (84.7%) and motivating to learn more (88.5%) were other effective roles in evaluation. Overall, 88.6% of students believed that Kahoot provides a better platform for providing feedback than traditional learning (Table 1).

Table 1: Students' opinions on the use of Kahoot as a formative assessment tool

N	Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
		F	%	F	%	F	%	F	%
1	Kahoot helps me focus on topics.	14	13.3	89	84.7	2	2	0	0
2	Kahoot motivates me to learn more.	12	11.5	93	88.5	0	0	0	0
3	Learning with Kahoot is fun.	102	97	3	3	0	0	0	0
4	I learn more with the feedback I get from the Kahoot.	96	91.4	9	8.6	0	0	0	0
5	Kahoot increases my understanding of things.	20	19	75	71.4	7	6.8	3	2.8
6	Kahoot helps to preserve my knowledge.	0	0	69	65.7	34	32.4	2	1.9
7	Kahoot simplifies complex matters.	0	0	25	23.8	75	71.4	5	4.8
8	Kahoot facilitates my learning about topics.	20	19	75	71.4	7	6.8	3	2.8
9	Kahoot is an effective way to provide feedback	96	91.4	9	8.6	0	0	0	0
10	Kahoot is an effective way to correct my misconceptions about things.	0	0	58	55.2	42	40	5	4.8
11	Kahoot is an effective way of reflective learning.	96	91.4	9	8.6	0	0	0	0
12	Kahoot is a better platform than traditional learning to provide feedback to students.	93	88.6	9	8.6	3	2.8	0	0

Some of the documentation for conducting a Kahoot-based test in the classroom is shown in Figures 1-3.

Figure 1: Test results performed on Kahoot platform

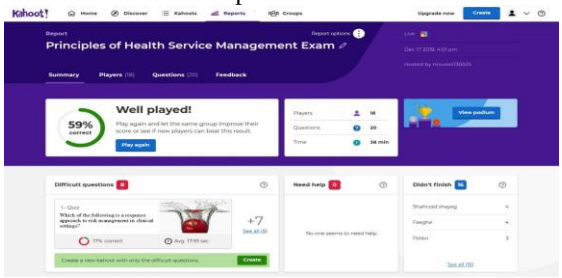


Figure 2: Test results performed on Kahoot platform-Players

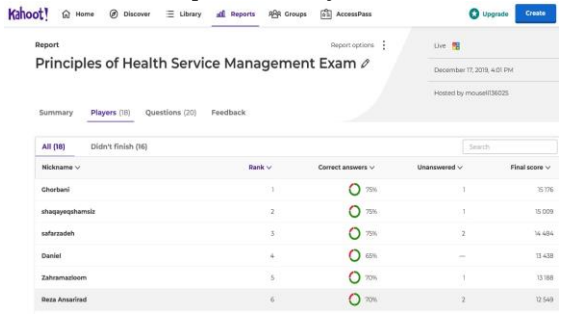
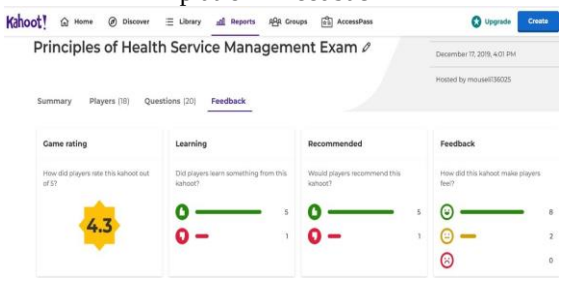


Figure 3: Test results performed on Kahoot platform-Feedback



Discussion

In this study, Kahoot was investigated as a formative assessment tool in medical science education. Students' evaluation of the Kahoot exam showed Kahoot was an effective platform for motivating students and enjoying the learning process. Kahoot! has played a significant role in enhancing the educational experience by making learning fun, providing feedback and more learning, and reflective learning. Focusing on the topic and motivating to learn more were other effective roles in evaluation. A qualitative study conducted by Ismail et al (2019) showed similar results (2). Another study with the aim of assessing a deeper understanding of the impact of Kahoot on student learning highlighted the benefits of using Kahoot as an effective assessment tool in medical education (4). This was consistent with the results of this study. The opportunity of setting goals, providing challenges and feedbacks in Kahoot can facilitate student's learning and create a fun learning environment. Learning with Kahoot was mainly considered as entertainment due to gamification features and audio and visual stimuli. The platform was also perceived as offering challenging activities, such as games for large groups where results are available in real time. In addition, the interactive features of Kahoot promotes active learning through increased interaction.Feedback plays an important role in the learning process. 91% of the participants stated that receiving more feedback will increase their learning. Receiving feedback increases the student's curiosity and involvement. It provides an opportunity for the teacher to identify gaps or weaknesses in content comprehension. Kahoot is more pleasant for students because it is more user-friendly than quiz (4). Yusoff et al (2011) noted that a strong internet connection and appropriate devices should be available before and during the session. In order to successful exam, faculty members should also be familiar with this platform (15). Due to its special conditions, education in medical sciences is associated with difficulties that can make students susceptible to mental distress. Compared to the general population, medical students experience higher levels of psychological distress (16, 17).Prensky (2001) showed that a fun learning environment, has the positive effects on education and reduces psychological distress (18). It was also

confirmed in the present study. To use Kahoot for fun learning, the sessions should be properly planned and ensure that desired results have achieved (19). Too much fun environment can lead to negative consequences (19). The results of this study also confirm the mentioned studies. Cauley and McMillan (2010) stated that formative assessment could have a significant effect on students' motivation and success (20). Kahoot is an external factor in facilitating continuous learning and academic performance (21). Learning through play is supported by research and empirical data as a usable tool for educators. It involves students in problem solving, critical thinking, and review of content knowledge (22). Students satisfaction about Kahoot and promotion of students' academic achievement due to indirectly creating positive emotions were showed by Keller (1983) (23). The safe, competitive, attractive, and fun environment created by Kahoot is also psychologically valuable. Students can participate in the competition with confidence and by being recognized by teachers and peers. They can increase their self-confidence (24). Norcini et al (2011) stated Kahoot encourage participants to thinking about their strengths and weaknesses. It also allows instructors to receive immediate feedback (5), which is consistent with the present results. Compared to traditional learning and other learning approaches, Kahoot can have a better effect on learning. Using Kahoot can affect class dynamics, such as improving teacher-student interaction, active participation in class, improving class atmosphere, and making it easier to answer questions in class and provide feedback.

Using the Kahoot platform enables instructors to create four different types of game-based educational content, including quizzes, polls, discussion, and debates in which participants compete with each other. Kahoot combines learning process with play, thereby maximizing student participation in the learning process. Thus, this platform is a promising tool for formative assessment in medical education.

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Conflict of interest
Author declares no conflict of interest.

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