

# Comparison of jeopardy game format versus traditional lecture format as a teaching methodology in medical education

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## ABSTRACT

**الأهداف:** مقارنة أداء الطلاب، وإعجابهم، ومدى احتفاظهم بالمعلومات باستخدام طريقتين: طريقة لعبة الجيوباردي، وطريقة المحاضرات التعليمية وذلك لتعليم طلاب السنة الخامسة في كلية الطب حول موضوع الطفح الفيروسي.

**الطريقة:** أُجريت هذه الدراسة في قسم الأطفال، كلية الطب، جامعة أم القرى، مكة المكرمة خلال العام الدراسي 2008م إلى 2009م. شارك في الدراسة 82 طالب وتم تقسيم الطلاب إلى مجموعتين (41 طالب في كل مجموعة). وألقيت على المجموعة الأولى محاضرة تعليمية تقليدية عن موضوع الطفح الفيروسي، بينما تلقت المجموعة الثانية نفس المعلومات بطريقة لعبة الجيوباردي، ومن ثم تم إخضاع المجموعتين إلى اختبارين: اختبار قبل، واختبار بعد، ثم أُجري مسح لمعرفة مدى إعجاب الطلاب. وبعد شهرين أُجري فحص ثاني لتقييم درجة الاحتفاظ بالمعلومات. تألف مسح القبول من 5 أسئلة باستخدام خمس نقاط (مقياس ليكرت)، وتم استخدام عينة اختبار مقترنة وذلك لمقارنة النتائج في المجموعتين.

**النتائج:** أبدت كلا المجموعتين تحسن ملحوظ بالمعلومات في الاختبار الأول مقارنة بالاختبار المبدئي قبل إعطاء المعلومات. ومع ذلك أظهر الاختبار الثاني الذي تم إجراءه بعد شهرين من الاختبار الأول أن الاحتفاظ بالمعلومات كان أحسن بشكل ملاحظ في المجموعة التي تلقت المعلومات عن طريق لعبة الجيوباردي. وأظهر مسح القبول أن إعطاء المعلومات عن طريق اللعبة كان ممتع ومليء بالفكاهة.

**خاتمة:** أظهرت الدراسة أن إعطاء المعلومات بطريقة اللعبة تقدم ميزة إضافية لاستبقاء المعلومات عن الموضوع لفترة أطول مقارنة بطريقة المحاضرات التقليدية. ولإثبات هذه الحقيقة، نحن بحاجة لإجراء دراسات على نطاق واسع.

**Objectives:** To compare students' performance, satisfaction, and retention of knowledge between a "jeopardy game format" and a "didactic lecture format" in teaching viral exanthema to fifth-year medical students.

**Methods:** We conducted a parallel-group randomized controlled trial in the Department of Pediatrics, Faculty of Medicine, Umm Al-Qura University, Makkah, Saudi Arabia from November 2008 to January 2009. We randomized fifth-year medical students into 2 groups. We taught viral exanthema to group one in lecture format, while group 2 received the same instruction in a jeopardy style game format. Both groups underwent a pretest, post-test I, and satisfaction survey. We conducted post-test II after 2 months to assess the retention of knowledge. The satisfaction survey consisted of 5 questions using a 5 point Likert scale. We used the paired sample t-test, and independent sample t-test to compare the results.

**Result:** Eighty-two students participated in the study (41 in each group). Both groups showed significant improvement in their knowledge on the post-test I compared with the pre-test scores. However, the post-test II conducted after 2 months showed that retention of knowledge was significantly better in the game format. The satisfaction survey showed that the game format was more enjoyable and fun.

**Conclusion:** The game format teaching strategy has an added advantage in retaining knowledge of the subject for a longer time compared with a lecture format.

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Engaging a wide and diverse group of students in a class is one of the greatest teaching challenges. Traditionally, didactic lectures have been the mainstay of core teaching in pediatric undergraduate courses. Gaming is one method of teaching that encourages participation, active learning, and offers a respite from the didactic lectures.<sup>1</sup> Games also lighten the mood, facilitating greater creativity, and boosting student morale.<sup>2</sup> While games motivate students and create an interactive, competitive learning environment, and their use in medical education is yet to be fully explored.<sup>3</sup> Though several studies suggest the beneficial effects of educational games in medical education,<sup>4-12</sup> little is known about their effectiveness on the long-term retention of knowledge. We performed this study to compare student's performance, satisfaction, and retention of knowledge between the "jeopardy game format" and the "didactic lectures format" in teaching viral exanthema to fifth-year medical students.

**Methods.** Following ethical committee approval, we conducted this study in the Department of Pediatrics, Faculty of Medicine, Umm Al-Qura University, Makkah, Saudi Arabia from November 2008 to January 2009. The pediatric rotation of medical students at our university comprises a 3 month teaching block during the fifth year. Didactic lectures constitute the bulk of teaching in pediatrics, and are given by the faculty using power point presentations. The study was designed as a parallel-group randomized controlled trial to compare students' performance, satisfaction, and retention of knowledge between the "jeopardy game format" and the "didactic lecture format" in teaching viral exanthema to fifth-year medical students. We choose "viral exanthema" as this was a new subject not taught to them in their previous clinical rotation. A statistician calculated the sample size for a study power of 80%, and identified that we required a minimum of 20 students in each group. We took the whole class of 84 students as a sample to compensate for any dropouts. In the second week of rotation, we randomly allocated the students into 2 groups (42 students in the lecture group and 42 students in the game group). We used a random number table to assign students to one of the 2 methods of instruction. One group received instruction in didactic lecture format while the other group received instruction in jeopardy style game format on the same content. The principal investigator gave instructions

in both the formats. After obtaining informed consent from the subjects, both the groups underwent a pretest comprised of 20 topic-specific multiple-choice questions just before the lecture/game. The students assigned to the game format were divided into 6 sub-groups, and the principal investigator explained the rules. The viral exanthema topic was divided into different categories, including definition of the primary lesions of exanthema, differential diagnosis, measles, rubella, exanthema subitum, erythema infectiosum, infectious mononucleosis, varicella, and enteroviruses. Using the Microsoft Power Point Program, questions were projected onto a large screen at the front of the classroom in full view of all the students. One of the students was selected to be the scorekeeper in the game. After the question was displayed on the screen, one of the students of the team would answer the question after discussion among themselves. Teams were awarded points for each correct answer and a minus point for each wrong answer. If the team found the question difficult and did not want to answer, they could pass it onto the next team without forfeiting a point, and this way the game goes on. The game format questions were designed in such a way to meet the teaching objective. The jeopardy game was modified slightly as some additional teaching points were identified, and the instructor explained this at the end of each question. A jeopardy display board, with various point values was projected in all the categories. Point values were based on the complexity of the questions. At the end, the team with the higher points received a token gift.

Students assigned to the lecture format received standard lecture using Microsoft Power Point. The content of the topic was the same in both formats. The lecture duration was 45 minutes. Immediately following each class, students in both the groups underwent a satisfaction survey and post-test I comprised of 20 topic-specific multiple-choice questions. We carried out a second post-test II, comprised of 20 multiple-choice questions, 2 months after the post-test I (namely, at the end of the pediatric course) to assess the student's retention of knowledge. The departmental curriculum committee approved and validated the contents of the instruction and the multiple-choice questions. A 5-point Likert scale was used in the satisfaction survey (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree). The questions in the satisfaction survey were adopted from a similar study in Obstetrics and Gynecology by O'Leary et al.<sup>10</sup> The questionnaire was in English and included the following 5 questions. 1) This educational format stimulates good faculty-student interaction. 2) This educational format stimulates good student-student interaction. 3) This educational format stimulates your interest and keeps

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you engaged in the class content. 4) This educational format is enjoyable and full of fun. 5) This educational format is an appropriate method of teaching.

We calculated the mean score and the mean difference along with standard deviation and standard error. We used the paired t-test to find out the difference between pretest, post-test I, and post-test II scores within each group separately. Independent sample t-test to compare pretest, post-test I, and post-test II between the lecture group and the game group were used.

Satisfaction survey between the 2 groups using the independent sample t-test were compared. We used the Statistical Package for Social Sciences for Windows program version 15.0 (SPSS Inc., Chicago, IL, USA) for all analyses and considered a p-value <0.05 to be statistically significant.

**Results.** Eight-two students completed the study (41 in each group). We excluded 2 students, one from each group, from analysis of the study, as they did not participate in the post-test II. The time taken to complete the instruction in the game format was a little longer (60 minutes) compared with the lecture format (45 minutes). Mean pretest scores were 10.9 in the game format, and 10.2 in the lecture format, the difference in the 2 groups was not significant. Both the methodologies were equally effective in improving knowledge of viral exanthema in the post-test I taken immediately after the class. The mean score in the immediate post-test I improved significantly in both the game and lecture format, and there was no significant difference between the post-test I scores of both groups. However, the second post-test performed 2 months after post-test I showed that students who participated in the game performed better as compared with the lecture group. The mean post-test II score dropped significantly in the lecture group. In contrast, retention of knowledge was significantly better in the game group as the mean

post-test II score dropped only marginally. Also, the comparison of the mean post-test II score of the game format and the lecture format showed a significant difference ( $p=0.01$ ). Table 1 and Figure 1 summarizes the mean pretest, post-test I, and post-test II scores in both groups.

Table 2 summarizes the results of satisfaction survey. It is evident from the tables that in addition to better retention of knowledge, the game format was more enjoyable and full of fun. It also sparked their interest and kept them engaged in the class. Overall, they preferred the game format over the lecture format as an appropriate method of teaching ( $p<0.000$ ).

**Discussion.** Due to the huge interest among students, and the benefits that games can offer to learning, studying how to implement games in our educational systems is worthwhile. Many types of educational games have been used in medical education, for example, “snakes and ladders” teaching on stroke prevention and management,<sup>12</sup> “card games” to teach immunology,<sup>13</sup> and “survivor games” to review pulmonary physiology.<sup>6</sup> The available evidence to date neither confirms nor refutes the utility of educational

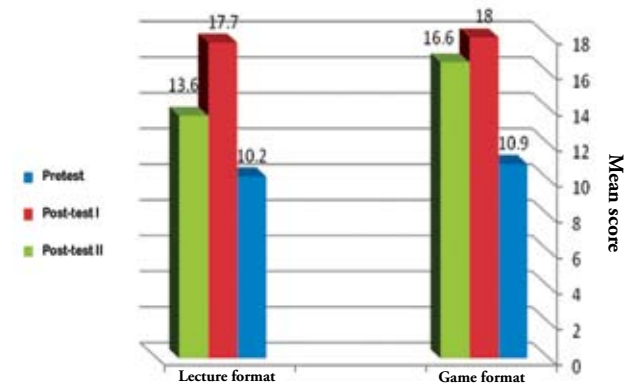


Figure 1 - Mean score in pretest, post-test I, and post-test II groups.

Table 1 - Comparison of mean pre-test, post-test I, and post-test II scores of both study groups (N=82).

Study groups	Mean pre-test score	Mean post-test I score	Mean post-test II score	Comparison of mean pre-test and post-test I score in same group	Comparison of mean post-test I and post-test II in same group
Game format (n=41)	10.9	18	16.6	CI: 6.433 - 7.714 t: 22.314 p<0.000	Not significant
Lecture format (n=41)	10.2	17.7	13.6	CI: 6.731 - 8.243 t: 19.984 p<0.000	CI: 2.201 - 3.750 t: 7.763 p<0.000
Comparison between the 2 groups	Not significant	Not significant	CI: -3.447 - 0.455 t: 2.5 p=0.01		

CI = 95% confidence interval

**Table 2** - Comparison of satisfaction survey in game and lecture format groups of 82 students.

Questionnaire	Game format	Lecture format	Comparison between the 2 groups
This educational format stimulates good faculty-student interaction	Mean 4.75 SD 0.435	Mean 2.51 SD 1.143	CI: 1.86 - 2.62 t: 11.75 p<0.000
This educational format stimulates good student-student interaction	Mean 4.60 SD 0.666	Mean 1.85 SD 0.358	CI: 2.52- 2.991 t: 23.35 p<0.000
This educational format stimulates your interest and keeps you engaged in the class content	Mean 4.80 SD 0.401	Mean 2.39 SD 1.30	CI: 1.991- 2.838 t: 11.352 p<0.000
This educational format was enjoyable and full of fun	Mean 4.73 SD 0.449	Mean 2.63 SD 1.019	CI: 1.752 - 2.44 t: 12.066 p<0.000
This educational format is an appropriate method of teaching	Mean 4.17 SD 0.77	Mean 2.80 SD 1.28	CI: 0.899 - 1.833 t: 5.823 p<0.000

1= strongly disagree, 2= disagree, 3= neutral, 4= agree, 5 = strongly agree  
SD = Standard deviation, CI<sub>95%</sub> = Confidence Interval

games as an effective teaching strategy for medical students.<sup>14</sup> There is very little published in the area of gaming as a teaching methodology in pediatrics. Our study demonstrated that both the strategies (lecture format and game format) were equally effective in the immediate post-test I. However, the recall of knowledge after 2 months was significantly better in the game format. The game format of learning is a rarity for the students. This was their first experience, and therefore it stuck in their minds because of the novel teaching methodology. Students in the game format responded more positively on the Likert scale for all the 5 questions included in the satisfaction survey (Table 2). The analysis of satisfaction survey showed that the game format was more enjoyable and full of fun compared with the lecture format ( $p<0.000$ ). In a similar study in Obstetrics and Gynecology, Sharon et al<sup>10</sup> compared jeopardy and a traditional lecture format in teaching medical students about ectopic pregnancy. They found that the game format was as effective as the standard lecture format in immediate posttest while being more enjoyable and stimulating. However, the second posttest was not carried out to compare later recall of knowledge between the 2 groups. Michelle<sup>15</sup> compared the "jeopardy" game versus the "lecture" on associate degree nursing student's achievement and retention of geriatric nursing concepts. Their results showed that the game group had greater retention of geriatric nursing concepts after 2 weeks than the lecture group. More recently, Telner et al<sup>12</sup> compared game based versus traditional case-based learning in a continuing medical education event on stroke prevention and management. The game was based on the board game "snakes and ladders," and they found no significant difference in scoring between the 2 groups on immediate posttest

and post-test performed 3 months later. However, the participants in the game-based group reported a higher level of satisfaction.<sup>12</sup>

Our study has several limitations. We could not control the other sources of information and/or academic activities that could have fed the student's fund of knowledge during the 2 months intervening period between the post-test I and post-test II.

In conclusion, our study supports the contention that gaming is a worthy educational methodology. It has an added advantage in retaining knowledge of the subject for a longer time compared with the lecture format, and it is well liked by the students. The findings of this study should encourage educators to consider using educational games more frequently. However, expanding on ideas for future research in this area would be beneficial to add evidence to the value of educational games.

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## Ethical Consent

All manuscripts reporting the results of experimental investigations involving human subjects should include a statement confirming that informed consent was obtained from each subject or subject's guardian, after receiving approval of the experimental protocol by a local human ethics committee, or institutional review board. When reporting experiments on animals, authors should indicate whether the institutional and national guide for the care and use of laboratory animals was followed.