

INSTRUCTIONAL DESIGN AND ASSESSMENT

Using Game Format in Small Group Classes for Pharmacotherapeutics Case Studies

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Objective. To incorporate games in classroom teaching to encourage student interest and participation in a small group pharmacy therapeutics case studies class.

Design. Using a television quiz show and classic board game format, students and the instructor developed games to discuss patient care plans. At the end of the course, a questionnaire was administered to assess students' attitudes and perception of using game format in the class and whether this teaching method was useful in reinforcing therapeutic knowledge.

Assessment. The majority of the students felt that games were beneficial in their learning process. The game format also resulted in higher student participation scores.

Conclusions. The game-format approach to learning aroused student interest, enhanced participation, and improved their participation grades. Although the game format of leaning is an effective way of actively engaging students in higher leaning, determining how these games improve test scores will require further assessment.

Keywords: pharmacotherapy, learning, game format, case study

INTRODUCTION

A challenge for pharmacy educators is how to capture students' interest and involve them in the learning process so that they will retain and eventually apply the information in their clinical practice. Adult learners are self-directed, have an internal motivation, and prefer active involvement.^{1,2} They also build on previous experiences, are problem centered, and have a need to learn practical and useful information.¹ The use of innovative teaching strategies, such as case studies and stimulations, focus on adult learning and can create a unique, fun, and stimulating learning experience for those that are involved.³

Playing a game is an interactive process that can foster active learning, teamwork, and increased motivation. Games offer a creative and interactive alternative to traditional classroom activities.⁴ A game that incorporates cooperative learning, communication, problem solving, and critical thinking in the safe environment of the classroom can be beneficial to the developing practitioner.⁴ Games can be competitive and adding a competitive environment can have a positive impact on learning. Games are an excellent way to teach content, create community among students and faculty, and enhance students' critical thinking abilities.⁵ Many health professions, such as

nursing and medicine, have utilized games to teach pertinent information to their students.³⁻⁶ Examples of games used in the classroom include board games to teach nurses ("The Med Cup Challenge"), computerized games to teach family medicine groups ("Stumpers"), "Name That Drug" to integrate commonly used medications into clinicians' knowledge base and to review pharmacology.^{3,5-8} Faculty development workshops have also been conducted to use games as active-learning strategies.^{9,10} The use of games is not intended to present new content, but rather to complement and reinforce existing knowledge. Games can be utilized in various settings including laboratory, large groups during lecture, and small groups for discussions. Goals, objectives, content, selection, and timing of a game are all important components in developing a game.

This manuscript discusses how games were developed and utilized in a small case studies class. The rationale behind this educational activity was to enhance learning, increase participation, and reinforce therapeutic knowledge. The overall objective of this educational activity was to develop a method that made learning more enjoyable and helped students to gain knowledge.

DESIGN

Principles of Human Disorders and Pharmacotherapeutics Clinical Case Studies I and II is a required

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third-professional year (P3) pharmacy course series conducted at the University of the Sciences in Philadelphia. Sixteen to 20 students are enrolled in each course section. The course meets once weekly for 2 hours and is facilitated by multiple faculty instructors. The case studies courses are companion courses to the *Principles of Human Disorders and Pharmacotherapeutics* lecture course series. The goals of the course are to further develop the students' ability to assess a patient case, determine reasonable alternatives for therapy, and select and recommend appropriate therapy.¹¹ Each week, the cases correlate with topics taught during the lecture series. The course is for students to develop an appropriate patient care plan and discuss it with their peers.¹¹ Students are given the case approximately a week before the class meets. Students work in pairs and must hand in their care plans before class. The discussion is presented using the SOAP (subjective, objective, assessment and plan) note format. Not all students were graded on their written case reports each week. However, each student was graded individually on participation every week.

Fifty points were allocated to participation, which had 2 parameters: activity (25 points) and quality (25 points). Aspects of the activity that were graded included did the student self-initiate or volunteer discussion and ideas? (15 points), was the student a contributing team member and engaged in the discussion? (5 points), did the student display leadership attributes? (5 points), and did the student not participate at all? (0 points).¹¹ Aspect of quality that were graded included: did the student provide accurate answers with rationale/insight? (10), was the student prepared for all class activities? (3 points), did the student consistently provide correct and/or relevant information (5 points), were the student's ideas clearly articulated? (5 points), did the student use medical/professional terminology? (2 points), and did the student not participate at all? (0 points).¹¹ The other 50 points were earned from the case write up. Points were earned for style, summary, problem list and assessment, findings, therapeutic plans, and monitoring plans.¹¹

One instructor decided to utilize games instead of the SOAP note format for discussing cases in both fall and

spring semesters. This teaching method was implemented in 8 classes (16 students per class) that were facilitated by the same instructor. The games were developed by both the instructor and the students. This provided opportunities for students to take responsibility for their learning objectives. In turn, the instructor was able to provide ongoing assessment and feedback. Specific "learning" objectives were developed for the games (Table 1).

Each week the instructor asked a team of students to volunteer to lead the discussion on the patient case. The students leading the discussion each week were allowed to choose the type/format of the game to be used. Games that were popular on television, board games, sports, and children's games were used as templates in the classroom. Each game had to be reviewed by the instructor for appropriateness and timing. Games were an hour in length, which left an hour for additional discussion, questions, and other assignments that were required in the class (ie, journal club or mini-cases).

The instructor designed the first game the first week of class to give the students an example. Students who volunteered to present the case in a game format were asked to meet with the instructor 1-2 days before class to review the game and material that would be discussed. The instructor gave feedback to students on both the care plan as well as the game itself. All materials and game setup were the responsibility of the students.

The games implemented by both students and instructor were diverse and included Trivia Pursuit, Jeopardy, Cranium, Monopoly, Battle of the Sexes, Hollywood Squares, Operation, and many more. Students also modeled their games after children's games such as Duck-Duck Goose and Musical Chairs. Students were asked to incorporate the following 3 major components in each unique game: the case and care plan, questions from their lecture notes that were relevant to the case, and additional trivia questions. Each week, 2 students developed a game and presented their case using the game format. Games were presented using PowerPoint, board games, or chalkboard, or by actually moving around the room. Examples of some of the games utilized are described in Appendix 1.

Table 1. Specific Objectives for Games Created and Played by Pharmacy Students in a Case Studies Class

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- (1) Prioritizing the problems for each case
 - (2) Assessing each problem and identifying the subjective and objective material
 - (3) Selecting appropriate non-pharmacological and pharmacological drug therapy and providing a rationale for each choice (Drug name and dosage)
 - (4) Listing monitoring parameters for each problem and identify adverse effects or toxicities of drug selected.
 - (5) Review specific material taught in class the week before pertaining to the main topic discussed in the case via questions directly from lecture notes.
 - (6) Choose random trivia questions to increase diverse learning and allow students to take a break from therapeutic knowledge.
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In order to play the game, a sufficient number of students were necessary. The students decided whether their game would involve teams or not. The students informed the class of the rules and directions for the game. The students were asked to have someone keep score while the instructor evaluated students on participation. At the conclusion of the game, a prize was awarded to the winning team.

A 15-item questionnaire was developed in *Blackboard* and given to students at the end of the semester to determine whether using games during case study discussion was beneficial in the learning process and whether this method of teaching helped reinforce knowledge taught in lecture. Students were asked to complete the questionnaire on the last day of the class.

Response options on the survey ranged from strongly agree to strongly disagree. Responses to open-ended questions were categorized as positive or negative in nature. In addition to feedback from the questionnaire, participation grades were compared to previous years when games were not utilized in the classroom.

The Mann Whitney test was used to compare average participation grade between classes that utilized the game format and those that did not ($p < 0.05$ set as a statistical significance).

ASSESSMENT

One hundred twenty-eight students participated in the game format teaching strategy. Games were played each week during both the fall and spring semesters. The instructor facilitated 1 course section in the fall and 2 in the spring semesters; hence, more than 20-30 games were played. Students were very innovative with the games that they instructed and examples are included in the Appendix.

One hundred twenty students (94%) completed the questionnaire. Students strongly agreed that the games were beneficial in their learning process. The majority (80%) agreed that the games reviewed case material completely and aroused interest in the lecture topics. Students felt that the games allowed them to actively participate and created a positive learning environment.

When compared with previous classes in which games were not used, weekly participation grades were lower than in the classes where the game format was used. Students' average grade was 37/50 when games were not used and 45/50 when games were used in the classroom ($p < 0.001$). Students stated that the games gave them a chance to participate, especially those who were shy.

Most of the students (78%) agreed that the games reviewed the case material completely and identified the problem and therapeutic options clearly. All of the students felt that games did increase their knowledge be-

yond the lecture material. However, students were undecided on whether games improved their test scores (70%). Forty-five percent of the students felt the games did not help them to remember or understand test material. The majority of the students strongly agreed (70%) and agreed (30%) that, overall, games were beneficial in their learning process.

Seventy-eight percent of the students' responses ($n = 94$) were positive and 22% ($n = 26$) were negative. The positive comments focused on the games being a fun way to review case material and that games provided a fresh learning experience that made the class enjoyable. Some positive comments included: "I thought the case games helped us to review test material and encouraged those students to participate who would normally not participate in a regular case class"; "I found the games in case studies to be an effective teaching method which stimulated a lot of discussion on different therapies and disease states among the other students." The negative comments focused on games being stressful and having to do more work. Some negative comments from students included, "I felt like the class was unorganized when the students ran the games." The majority of the students felt that games were beneficial in their learning process and it did improve their participation scores. Students commented that games did not improve test scores in the complimentary lecture series course. Test score data were not evaluated or compared.

DISCUSSION

Games improved participation scores for the students as described above. Students earned points for leadership, participation, and preparation. The game format sparked interest among the instructors and students in the other classes and those instructors may use the game format in future classes. However, games did not improve test scores in the complimentary lecture series course. This could possibly be explained by the cases only focusing on certain core topics; whereas, the examinations hold students responsible for the material from the entire lecture, even if the material was not discussed in the case studies. Also, the questionnaire was given to the students after the case studies course was completed and not after each examination. Examinations in the lecture series are conducted throughout the year; hence, the students may have only evaluated the most recent examination before they completed the questionnaire. Therefore, future games would have to be structured to focus more on tangible information that will be helpful to students.

Many factors must be considered before initiating games in the classroom including size of the class and the setting. The content amount, timing, and targeted

audience all affect the type of game utilized.³ Selecting the appropriate game for each topic is also important. Before developing the game, the desired length of time must be determined. A desirable timeframe for most games is 1 to 2 hours.^{3,10} Games may not be an effective teaching strategy for some learners who struggle to process the information or who do not enjoy playing educational games. Therefore, the class curriculum should include other strategies to accommodate different learning styles. Furthermore, evaluation and feedback from the participants is valuable in assessing the success of the games and making necessary revisions.^{10,12} A more valid measure of the game's success are the students' posttest scores. Comparing pretest and posttest scores for 2 groups of learners can truly test the effectiveness of the game in learning.¹³ Studies comparing standard lecture format with gaming found that interactive teaching can enhance learning, and gaming is one tool that has gained increasing attention.¹³⁻¹⁵

The instructor has to decide when games are appropriate for a class or learner. Evaluating the advantages and disadvantages can help decide when to use games in the classroom. There are many advantages to using games as well as several disadvantages. Games promote team work, generate enthusiasm, stimulate thought processes, and provoke recall.^{3,10} They can foster an environment that is less stressful for the learners. Anxiety often hinders students from fully engaging themselves in discussions with their peers. Other advantages are the interactive participation, collaboration, immediate feedback, creative "outside the box" thinking, and the fun and excitement created while playing the game.³ Disadvantages include the cost of developing or purchasing the game and the time consumed in developing the game. Even though it may be less stressful to some, many students may feel overwhelmed because they need to learn to play a game in addition to learning and recalling the material that needs to be covered in the class. The goal and objectives of the game should be clearly defined prior to its development and students should be informed ahead of time if a game format will be used for the class and given instructions to help them prepare for the class.

Continued research in the area of creative educational strategies needs to be instituted in order to provide direction for game development. The use of games can make the learning experience more dynamic and informative if structured and organized.

CONCLUSION

This educational activity using a game format to enhance knowledge in clinical case studies shared the re-

sponsibility of learning between the instructor and the students. Students developed new skills for acquiring knowledge. In addition, their presentation skills improved. Students became self-directed, life-long learners as they become aware of their own learning skills. Games can offer a variety of in-class experiences to promote decision-making, communication, and knowledge acquisition.⁴ The games aroused students' interest and participation. Based on feedback from the questionnaire, games will continue to be incorporated in the class and utilized by other instructors for their small group classes within the same course.

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Appendix 1. Examples of games played in the Case Studies class.

TRIVIA PURSUIT

Players

The class was separated into teams of 4 using a random number table.

Objective of game

Each team must complete the pie by getting all 12 pieces to the pie. Each piece of pie correlated with a number on the die. Pieces of the pie were earned by answering the question correctly.

Playing the game

In order to determine what kind of question would be asked (case, lecture notes, or trivia) players were asked to roll a die.

- If the player rolled an even number the team was asked a case question (ie, What was your drug of choice for problem number 1). If the team answered the question correctly, they received a pie for the number they rolled.
- If the team rolled an odd number they were asked either a notes question or a trivia question. If the team answered the question correctly, they received a pie for the number they rolled.
- If the team answers a question incorrectly, they lost the pie that correlated with the number they rolled on the die. The first team to complete the pie won the game.

CRANIUM

Players

The class was separated into teams of 4 using a random number table.

Objective of the game

To earn as many points from the deck of cards. Each card had designated question and designated amount of points.

Playing the game

Each set of cards included a question relevant to the case, a question from the lecture notes, or a Cranium card from the actual Cranium® game. Teams were asked to pick one card. If a team member picked a card with a question from their lecture notes, that student was asked to ACT out the adverse drug reaction they learned from topics taught that week in lecture and the team had to name the drug that caused that reaction. (ie, Flu-like symptom)The team with the most points won the game.

JEOPARDY

Players

The class was separated into teams of 4 using a random number table.

Objective of the game

To gain the most amount of dollars by answering the questions correctly. Each team gets to choose a topic and the amount of money they want to earn.

Playing the game

Topics on the board included: Problems for Case, Treatment Options, Monitoring Parameters, Questions from the Notes, and Random Questions. Each team was asked to choose a topic and the amount of dollars similar to the game show. The team with the most amount of money earned at the end of the round wins.

MONOPOLY

Players

Each team had 2 players.

Objective of the game

To land on items that allowed the player to earn the most amount of money, similar to the board game. Instead of places, the blocks were labeled as either lecture notes, case categories (problem list, subjective information, monitoring, etc), or random trivia. The corners included go to lecture class (instead of go to jail) and forgot to wear lab coat or chewing gum in lab (pay fee).

Playing the game

Student teams rolled the dice. They were asked a question that related to the block they landed on. A certain amount of dollars was earned for the question if it was answered correctly. The team then owned that space and if another team landed on their property, they had to pay a fee. The team with the most amount of money earned at the end of the game won.
