INTRODUCTION

Numerous studies have shown that drawing pictures to convey words and concepts can improve memory and comprehension (1–3). This beneficial drawing effect can be attributed to the cognitive processes required to convert written text first to a mental image, and then to a visual representation through mechanical movement (1, 2, 4). Drawing requires learners to organize and process key information in a different way than writing, and these connections not only can improve comprehension and free recall of terms, but can serve as a scaffold for future learning (3–5). These are some of the benefits that students have gained by playing a team-based competitive drawing game similar to the popular board game, Pictionary (6).

The use of a Pictionary-like review game in the classroom is a tried and true strategy for the review of course material. A simple online search reveals hundreds of thousands of ideas for incorporating this classic game into classrooms across diverse disciplines. Many versions of the game, including a recently published version (7) require only one team to draw/guess at a time, while the other team remains silent. My modified version, described below, has teams racing to draw against each other, simultaneously, similar to the “All Play” round of classic Pictionary (6). This modification increases both the pace and competitiveness of the game, and allows every student to participate in each round of the game, effectively doubling the opportunities for active participation and learning for each student. I also provide the first survey assessment of a Pictionary-like game in an undergraduate microbiology classroom, as well as sample student responses, which help to confirm what educators have only assumed—that these competitive Pictionary-like drawing games are both fun and effective strategies to review course material in an undergraduate classroom. The current version, described below, can easily be played in small increments of time (15 to 45 minutes) in either a laboratory or lecture setting and has been tested with students enrolled in two different introductory microbiology courses. The game is played with a large chalkboard or whiteboard, and requires almost no preparation time.

PROCEDURE

 Participating students are divided into two teams of similar academic ability. Each team selects one representative at a time to draw/guess at a time to draw the same secret microbiology term, chosen by the instructor. After a countdown, the representatives compete against each other, using drawings, to get their team to guess the same secret term (Fig. 1). The first team to correctly guess the word or phrase wins their team a point. Since both teams compete at the same time, all students have the opportunity to participate as either drawers or guessers for their team, in every single round. The rules for the drawer are simple and very similar to the traditional Pictionary board game: no talking, no sounds, no gestures, no numbers/letters. Otherwise, students can draw anything that will get their team to say the exact secret word/phrase. Since this version calls for two simultaneous drawers rather than one (7), it may help support the participation of timid students who do not wish to be the sole center of attention. As for knowing what to draw, students in science disciplines are already accustomed to seeing visualizations of scientific concepts from their course resources (textbooks, handouts, etc.), so asking them to recreate simple depictions is usually well within their abilities. Occasionally, a student will be able...
to draw something more familiar and nonscientific to get their team to guess the secret term. For example, a student might draw a bee (the insect) and an arrow to an empty circle to lead her team to guess “B cell.” In our experience, these non-academic drawings tend to be few and far between and simply add humor to the game.

Similar to other versions (7), after the secret term is guessed correctly, both teams respond simultaneously to rapid-fire questioning about that term or definition, again enabling participation by all students in the classroom. For example, if the term was “antibody” students might be asked, “what are the five classes of immunoglobulins?” and “which class can cross the placenta?” and “at most, how many antigens can one pentamer of IgM bind to?” This rapid-fire questioning is where the real review comes in, but at this point, students are excited and happy to answer, they do so quickly, and the game continues with two new drawers and a new secret term.

Other suggestions for a fair and competitive game are to limit the drawing time to three minutes, to give one or two extra credit points for the winning team members, to require a minimum number of drawers on each team, and if possible, to block the view between the two competing teams to prevent cheating. Lastly, the game tends to get fairly rowdy, so choose a space that will not disrupt nearby classrooms. Basic rules and tips, as well as a suggested word list, are included in Appendix 1.

All participants were given an anonymous survey after their first time playing the game to assess student perceptions of the competitive drawing game as a review strategy. Survey data were collected in fall 2016, spring 2017, and spring 2018 from a total of 64 students in two different general microbiology courses—one for biology majors, and one for nursing and health science majors.

There are no safety issues associated with this activity.

CONCLUSION

This ultra-competitive version of the classic Pictionary game has been a successful and wildly entertaining in-class activity for review of microbiology terms and concepts. In a discipline where form and function are critical to understanding concepts, this game serves as an excellent review tool that provides a visual form of recall and studying. From anonymous surveys over three semesters, 100% of surveyed students felt that this version of Pictionary was a fun classroom activity and 98% would recommend the activity for future classes. When asked to rate the exercise as “very ineffective,” “ineffective,” “I feel indifferent,” “effective,” or “very effective” as a strategy for review, 94% of students rated the activity as “very effective” or “effective” (Fig. 2), and the rest rated the activity as “I feel indifferent.” No student rated the activity as an ineffective review strategy. Written comments from student evaluations were also overwhelmingly positive in reference to the fast pace, intense competition, and effectiveness of the game for learning (Table 1). This assessment adds to the growing body of evidence in favor of using classroom games as learning tools to review course material (8–10).

SUPPLEMENTAL MATERIALS

Appendix I: Sample words for competitive drawing game in microbiology, quick rules, and tips

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An explanation and demonstration of this modified version of Pictionary was given as a microbrew presentation at the 2017 American Society for Microbiology Conference for Undergraduate Educators. The author declares that there are no conflicts of interest.

TABLE 1.
Selected comments from the student surveys about the overall experience of the review game.

| Comment                                                                 | Percentage |
|------------------------------------------------------------------------|------------|
| “It was very fun. Got very involved. Made you think about the material in different ways to make everyone understand what you are drawing. Full of laughs. Time well spent!” | 63.3%      |
| “A lot of the concepts we learned about were accompanied by picture diagrams, so [the game] successfully brings back those associations and perhaps creates some new ones.” | 45.3%      |
| “When guessing it made us think about all of the topics we’ve covered during the semester. When drawing we had to be knowledgeable enough about the topic so that our teammates would be able to guess the answer. It was fun and a great review.” | 48.4%      |
| “I thought it was very effective. You really have to know the vocabulary to be able to draw an accurate picture and guess it. Also the incentive of bonus points made it fun and competitive.” | 6.3%       |
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