Having fun and accepting challenges are natural instincts: jigsaw puzzles to challenge students and test their abilities while having fun!

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Submitted 4 October 2013; accepted in final form 21 January 2014

CROSSWORD PUZZLES, hidden messages, word scrambles, word searches, card games, and “virtual” rats are used to motivate students, enhance their understanding of physiology, and foster logical thinking and problem-solving skills (1, 5–7). Similarly, jigsaw puzzles advance these attributes while also promoting the development of visual-spatial processing skills (9). The process of constructing the jigsaw picture begins with identifying visual clues to help students assemble the image. The visual cues also require that the student form a mental picture of how the image should look. In essence, the students generate a prediction of what they expect to see when the puzzle is complete. Ultimately, solving the jigsaw puzzle involves inquiry, discovery, abstract visualization, predictions, and troubleshooting. These visual-spatial and critical thinking skills are often cited as goals of active learning and represent the underpinnings of the spirit of science.

Jigsaw puzzles are also effective because students are naturally curious with powerful intrinsic motives to challenge and test their knowledge. Specifically, as students learn, they acquire new knowledge and are eager to practice and test their abilities. Furthermore, because jigsaw puzzles are fun and challenging, students will endure and discover that persistence and grit are rewarded. Importantly, play and fun have a biological place just like sleep and dreams. Students also feel an enormous sense of accomplishment when they have completed the puzzle. Importantly, the reward of mastering a challenge builds confidence to take on subsequent challenges. Specifically, students get a real sense of success and satisfaction from their personal achievements and independent learning.

To take advantage of our first-year medical students’ powerful intrinsic motives to challenge and test their knowledge, we printed every figure from our note package onto card stock paper. Using a commercially available, inexpensive puzzle maker (Sizzix Puzzle Maker Die no. 2; http://www.sizzix.com/product/654992/sizzix originals-die-puzzle-maker-2), we created six-piece jigsaw puzzles of each figure (Fig. 1). To increase the challenge, the final puzzle packs given to students consisted of 6 figures, resulting in a total of 36 pieces/pack. After each class, students received packets of puzzle pieces from the figures discussed that day. Students were required to construct the puzzle, tape the pieces together, and write a caption describing the figure. During this process, students were instructed to think about what they were learning, write about it, relate it to other figures, and apply it in an integrative context.

Since extrinsic rewards or punishments (carrots or sticks) are well documented to suppress motivation and stifle creativity, no grade or consequence was associated with the activity; however, the professor read and commented on every puzzle. Student intrinsic motivation to perform the activity is the highest incentive possible. Intrinsic motivation, which reflects the highest degree of self-determination (10), includes actions and behaviors that are accomplished for the purpose of self-
fulfillment. Specifically, these actions and behaviors are carried out voluntarily for personal fulfillment and may or may not produce material rewards (11, 12). Intrinsic motivation has the most positive impact on school performance ranging from elementary schools (2–4, 8, 12) to medical schools (13).

The professor’s impressions and student comments indicated that jigsaw puzzles are fun, challenging, innovative, and rewarding educational materials that enhance and supplement the traditional lecture format. It is our view that jigsaw puzzles facilitated active learning, enhanced problem-solving skills, and encouraged group discussions. Specifically, students were eager to compare, contrast, and share their captions in a friendly, competitive atmosphere. Because the jigsaw puzzles also increased student involvement, motivation, and interest in the material, we recommend their use for enhancing and supplementing the traditional lecture format.

DISCLOSURES

No conflicts of interest, financial or otherwise, are declared by the author(s).

AUTHOR CONTRIBUTIONS

Author contributions: H.R., H.L.L., D.R., and S.E.D. conception and design of research; H.R., H.L.L., D.R., and S.E.D. performed experiments; H.R., H.L.L., D.R., and S.E.D. analyzed data; H.R., H.L.L., D.R., and S.E.D. interpreted results of experiments; H.R., H.L.L., D.R., and S.E.D. prepared figures; H.R., H.L.L., D.R., and S.E.D. edited and revised manuscript; H.R., H.L.L., D.R., and S.E.D. approved final version of manuscript; S.E.D. drafted manuscript.

REFERENCES