Maximize a team-based learning gallery walk experience: herding cats is easier than you think

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TEAM-BASED LEARNING (TBL) is an instructional strategy that promotes small group learning and peer instruction in a large class environment (5). TBL is structured to include the following steps: 1) student preparation, e.g., reading/reviewing course lectures, and 2) readiness assurance testing. Preparation and foundational knowledge is assessed on an individual basis first. Subsequently, students retake the readiness assurance test in their teams using immediate feedback assessment technique lottery-style scratch cards (Epstein Educational Enterprises). The combination of peer instruction and immediate feedback lets students first address team knowledge gaps. The facilitator(s) can review the immediate feedback assessment technique cards and discuss any apparent foundational knowledge gaps before moving onto the final step. 3) a group application exercise. This is a series of questions designed to task teams with applying and synthesizing their knowledge with external resources to solve and discuss specific problems that reflect similar real-world issues. Student discussion during the TBL application phase is essential. TBL structure and well-facilitated discussions helps ensure that the foundational underpinnings are clear to students before the application exercise is conducted. Lastly, well-designed application questions promote content integration and comprehension due to the applied nature of questions. The role of a faculty person during the application phase is to be a facilitator rather than the “sage on the stage.” Thus, a faculty person should consider judicious but meaningful methods that promote the integration of class material, critical thinking/problem solving, and class discussion.

In the medical classroom, the application exercise often involves “unfolding” a clinical case using a set of “scaffolded” questions. While multiple-choice questions (MCQs) may be used during an application exercise, the nature of identifying one correct choice and/or ruling out distractors as a clinical case is rolled out becomes a game of pattern recognition rather than thoughtful and creative application of knowledge. Furthermore, TBLs using only MCQs become monotonous. An individual’s professional life is not composed of series of MCQs. Most careers deal with solving problems and/or creating products (physical and/or mental) that are applicable within one’s field. Encouraging the incorporation of open questions helps develop professional life skills. For example, a medical student needs to learn the skill of generating a diagnosis based on information provided. A veteran physician assesses information and quickly generates a mental list of possible issues and/or additional tests/questions to rule in/out a diagnosis. Having student teams generate these lists followed by review and discussion promotes not only the retention of knowl-edge but also the application of skills and attitudes necessary for being an effective physician. Therefore, the practicality of open application questions improves student “buy in,” resulting in greater learning impact. One open application question method we have used during TBL that gets students moving, thinking, and talking is a gallery walk (2).

A traditional gallery walk requires teams of students to rotate between stations to answer or build on other teams’ answers at each station. The faculty person needs to identify the question or problem for each station. Once all teams have visited each station, presentation and discussion by the class follows (2). Gallery walks are beneficial since they promote critical thinking, communication, and practice with critical evaluation of new information as students wrestle with nuance and misconceptions that may be included in the products they review. One benefit of a gallery walk versus MCQ assessment is that it expands the depth of assessment. MCQs, regardless of design, largely evaluate lower-level cognitive process (recall and recognition) and falter with respect to integration of concepts and viewpoints as well as synthesis of student identified external resources with faculty-identified solutions (4). Importantly, gallery walks generate physical activity and fun in the classroom (1). However, the gallery walk can generate a great deal of “classroom chaos” with a medical class of 20-25 teams with 100–125 students moving about the classroom. This class chaos is atypical to most medical educator/facilitators. Based on class observations and student feedback, we implemented a proscribed gallery walk method to improve time management, reduce confusion over material presented on other teams’ products, improve student ownership/comprehension of material, and reduce stress for both student and facilitators.

Methods. The proscribed gallery walk process breaks up teams into specific reformulated TBL teams. Rather than one team visiting each other teams’ product over a period of time, the team is split up with one teammate remaining with the team project while the remaining teammates visit other team products. One student per team is selected to serve as the “docent” for their team’s product (Fig. 1). Thus, we were assured that each reformed team was going to have a more robust and diverse discussion with a group of student’s ambassadors from other teams at each display. Having a team representative (the docent) and ambassadors representing other team products asking/answering questions within reformulated teams promotes ownership and engagement by all. Rather than asking 20 teams to rush and attempt to view the other 19 displays, a team would be dispersed to see 4 other posters (assuming a team of 5 students) but also hear from students involved with generating 3 additional products not assigned to their team (Fig. 1). By selecting a team docent, the facilitator is also promoting peer instruction and qualitative problem-solving skills (3) since the docent can also restate feedback to their teammates that was given during the gallery walk. The team can...
Formulated TBL Gallery Walk Process to Maximize Time and Discussion

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<th>TBL Team 1 Docent</th>
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Discuss team products and then TBL team 1 Ambassadors reconvene with Team 1 Docent to learn what other teams responses were

Fig. 1. Example of the structured gallery walk process for team-based learning (TBL) team 1. One student is identified as the docent. They remain with the product that the team generated to address a TBL group application question. They are responsible for providing an overview and answering questions from student ambassadors representing TBL teams 2, 3, 4, and 6. The four student ambassadors from TBL team 1 disperse to learn from TBL team docents in teams 7–10. In addition, there are three other TBL team ambassadors to participate in those discussions. All TBL teams reconvene to report on what they learned from other teams. A facilitator may then provide an opportunity for teams to modify their response and/or proceed to facilitate a discussion after the gallery walk. In this example, a 5-min gallery walk and 5 min of reflection after the gallery walk has enabled the students to perform peer instruction, spend more meaningful time discussing responses within more diverse groups, and gain greater exposure to more teams’ viewpoints.

then evaluate all the information and determine if their product can be improved on before the final discussion.

To implement the proscribed gallery walk during a TBL application question, a facilitator displays a copy of the gallery walk assignment (Fig. 2B is an example) with the specific application question. The teams are then provided 5 min to generate a response and then instructed to disperse and talk for 5 min with another team’s docent. The teams are then asked to reconvene to reflect and digest for another 5 min followed by 5 min of facilitator-led discussion. A total of 20 min could be devoted to one prescribed gallery walk. These proscribed gallery walks permit more meaningful time spent on peer instruction, increase the diversity of discussions due to reformulated teams, and maximize exposure to a greater number of team responses in a shorter period of time. For example, the docent for team 1 is presenting to students from teams 2, 3, 4, and 6 while the four ambassadors from team 1 are interacting with docents from teams 7–10 (Fig. 1). Additionally, there are three other students from different posters as well. In this example, team 1 has exposure to nine different team products during the 5-min proscribed gallery walk.

To generate the gallery walk assignments, a Microsoft Excel template with color-coded teams was created (Fig. 2A). This permitted visual reformulation of the teams (Fig. 2B). To enable other educators to adopt this proscribed method, we are providing an Excel file with reformulated teams of 5 students/group for class sizes of 50 (10 teams), 75 (15 teams), 100 (20 teams), and 125 (25 teams).1 Rather than using student names, a facilitator could provide each team with a small bag of marbles with numbers 1–5 on them. Students could be instructed to randomly draw marbles to identify their number and subsequent gallery walk assignment (docent or ambassador team assignment). This would promote equity and engagement by all students since it will not be known who is the docent or an ambassador until the drawing commences for each gallery walk.

Observations/outcomes. When we first implemented gallery walks during TBL sessions, we were spending 30–40 min on one question. This included 5 min for teams to generate answers. It took ~20 min to perform a gallery walk (~1 min per team product with 20 teams) followed by an additional 10–15 min for teams to reconvene, reflect, and discuss the application question with respect to what they viewed. Both students and facilitators reported that the time on task was too long for one question. The proscribed process reduced time on task to ~20 min including discussion. Furthermore, intrateam discussion is an additive benefit that is absent during the traditional gallery walk. Facilitators were also reporting some anxiety from the viewpoint that they may be losing control of the classroom when we first attempted gallery walks. The proscribed process made classroom management more efficient and organized. It also made it easier for facilitators to regain class control when it came time for discussion. Initially, a great deal of time was also spent on circulating around the classroom during our initial attempts at using gallery walks. Dead time would also occur while teams waited to see a poster another team was already looking at. Predefining where students went helped with making it an orderly process with greater accountability. Students were reporting difficulty with seeing/reading/interpreting meanings from other team products initially. Having a docent present to answer questions or help with interpreting meaning during the proscribed gallery walk alleviated those issues encountered during our initial attempts incorporating gallery walks into TBL. Finally, facilitation of discussion was difficult with our initial adaption of gallery walks during TBL. For example, student teams either did not see all the products or could

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1 Supplemental material for this article is available from the Advances in Physiology Education website.
not remember which team and poster were associated during the gallery walk, e.g., a team forgot to include team identification on their product. Additionally, students had a hard time remembering which team product sparked an idea or change in their team's product after viewing up to 19 different products in a brief period of time. As a result, teams were not refining their answers after viewing other team products. It was very difficult for students and facilitators to identify which team could provide context for their team product during the discussion also. Having one student responsible for viewing only one other poster meant a team could communicate specifics about what a student may have seen on their assigned poster that they felt was of value. The facilitator could then call on the other team to provide more detail during the conversation.

Summary. Based on these observations, the proscribed gallery walk process improved time management, student engagement, and student accountability. Peer instruction and general class discussion were also enhanced. We perceived more meaningful discussion during gallery walks using this proscribed technique. Furthermore, we observed teams modifying their responses on their boards (concept maps in one case) based on what they were learning from other students following the proscribed gallery walk. Most importantly, using the proscribed gallery walk deemphasized the memorization of “the best answer” to questions, and students appeared to do a lot more thinking and having more fun interacting within reformulated teams during the TBL (1).

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

AUTHOR CONTRIBUTIONS
Author contributions: D.W.R. conception and design of research; D.W.R. performed experiments; D.W.R. analyzed data; D.W.R. interpreted results of experiments; D.W.R. prepared figures; D.W.R. drafted manuscript; D.W.R. edited and revised manuscript; D.W.R. approved final version of manuscript.

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