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Revisiting Think-Pair-Share:
An Expanded "How-To" Guide

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Revisiting our CAE Teaching Excellence Workshops
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After attending the Austin CAE Teaching Excellence Workshop in January, Amy Forestell, UT Austin graduate student, decided to take a look at the Think-Pair-Share Teaching Strategy on our CAE website ("Think-Pair-Share: A 'How-To' Guide" by Prather, Slater, & Brissenden; April 2005), but she found that many of the important details we discussed and modeled during the workshop were not included in the basic how-to guide. Using Amy's notes on Think-Pair-Share from the workshop, we've updated the how-to guide and highlight the key points that were missing in the previous version that we believe are essential to proper implementation of Think-Pair-Share. These additions should be a useful reminder for those who have attended the workshop and a helpful update for those who are unable to attend one. Thanks, Amy, for being so insightful about this portion of the workshop and the resources on the CAE website!! Your contributions are going to be helpful to everyone using Think-Pair-Share!

Faculty often ask us what they can do to "get out of lecture mode" in their classrooms. One relatively easily implemented way is to use Think-Pair-Share questions. "This simple questioning technique, introduced by Lyman (1981) and popularized within the physics community by Eric Mazur in his book Peer Instruction (1997), provides an additional layer of structure beyond simple questioning and takes advantage of the power of discussion for making meaning" (Slater & Adams, 2003, p 44). So how do you effectively implement Think-Pair-Share in the classroom? Here's a "how-to" guide:

Rigel is much more luminous than Sirius B. Rigel and Sirius B have the same temperature. Which star has the greater surface area?

a. **Rigel**
b. **Sirius B**
c. **They have the same surface area**
d. **There is insufficient information to answer this question.**

- Create a cognitively engaging multiple-choice question (See example at right.) that challenges students thinking and has the ability to foster deep discussion amongst your students. For additional questions see Learner-Centered Astronomy Teaching: Strategies for Introductory Astronomy (Slater & Adams, 2003) and Peer Instruction for Astronomy (Green, 2003).

  In most cases you will have a question already prepared, but you can also create questions on the fly in class. Just be sure they are conceptually rich and of course multiple-choice.

- Present question to students.

- Ask students to "think" individually about the question for "x" seconds or minutes.

  Say, "Here's a question that we will vote on" or simply, ‚Question." Don't go into a lengthy introduction or description. Don't read the question aloud. Read it to yourself slowly as if you were a student reading it for the first time and had to answer it. And then actually go through the reasoning necessary to decide which of the choices is the best and why the others are not correct.

  When you are finished you should have a sense that most students are done and getting their cards ready to vote. Say, ‚How many people need more time?" Don't say something like ‚Everyone done?" because you don't get good feedback from that. If many students actually need more time they will let you know.

- Have students anonymously provide their answer to the question simultaneously as a class.

  When most students are ready say, "Vote on the count of three. One, two, three, vote."

  The students will each have a piece of paper divided into four colored sections labeled A, B, C, and D. The students will vote by folding the paper to show the correct answer and holding the card to their chest so that other students can't see each others votes. For option E, use a white square from the back side of the A, B, C, D card. For unknown or guessing show all four squares at the same time. In small classes students can use their fingers to vote.

- Decide if students should "share" their answers with each other. This is the case when about 50% of the students are correct. If more than ~80% of students are correct, there is no need to discuss the question further. If fewer than 50% of students are incorrect, there isn't a critical mass for fruitful discussion.

  Estimate the percentage of students who got the right answer. There are three likely courses of action to take based on this percentage.

  If less than 50% of the students got it right or if there are two popular answers or obvious confusion: There is likely something unclear in the question that the students are having trouble with. You have a teachable moment here. You need to consider if it is a problem with the question or with the instruction before the question was asked. One way to find out is to ask the students if there is something you could do to help them interpret the question, or reword it, if there is something confusing. If they don't offer a question to get help or clarification, this is a good indicator that you may need to step back and ask a less complex question or revisit the

central ideas of the question with your class again.

If more than 80% of the students got it right: Enough of the students understand it. Say, “About [X percent] of you agree. Good job.” Or say, “Only [X] of you aren't getting it” while looking at those students. You may then say, “I'm glad you understand [concept]” or, “Several of you may still be confused by [common problem].” It is difficult not to, but can be very pedagogically valuable not to, explicitly tell them what the correct answer choice is, rather describe the correct thinking or how they recognized what was incorrect. After this turn away briefly so that students have a chance to compare with their neighbor to make sure they are right if they choose to.

If between 50% and 80% of the students got it right: This is the sweet spot—move on the next bullet!

- Ask students to “pair” with someone next to them and to “share” their answers with each other with the goal of trying to convince their partner that their own answer is the correct one. If both students have chosen the same answer, they should “pair” with a different student.

  Tell the students, “Find a person who has a different answer than yours and convince them that you are right. You have [time limit] minutes.” You may remind them that this might require getting up and moving around the room.

After they have had enough time (not necessarily the time you said) tell them to stop. To get their attention you may have a happy place in the room you return to, flash the lights, or ring a bell.

- Have students anonymously provide their answer to the question simultaneously as a class.

  Say it is time to vote again. Vote as above: “One, two, three, vote.”

- Share the results with your students.

  At this point more than 80% should be correct. Follow the directions above provided for the case where 80% or more get the question correct at the first voting. Challenge yourself to not give them the letter of the correct answer.

To learn more about Think-Pair-Share and other non-lecture teaching techniques, check out the book *Learner-Centered Astronomy* or, better yet, attend one of our workshops.

References

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