

Practical Tips for LEAD Learning Center Operation

Learning centers at S&T are designed to improve student learning skills and understanding of the learning process at teachable moments. LC instructors guide and surreptitiously orchestrate the spontaneously formed groups into acquisition and demonstration of appropriate insight and skills without becoming part of the group. The LC style is a version of guided cooperative learning focusing on compact problems or tasks of immediate concern to students because they know they must soon demonstrate mastery of the material and techniques needed to solve the problems. Basically, students form a course-based learning community.



The Physics 23 LEAD Learning Center (<http://www.campus.mst.edu/physics/plc>) was the prototype Learning Center, established in 1997 for Engineering Physics I. About 55% of students taking the course voluntarily use it regularly.

1. Learning centers are not tutoring centers. At the start of the semester, students will come in to ask for assistance and expect to be shown how to solve problems. Resist this mightily! Try not to sit next to them for then you are partner in the solution. Your first few responses should be "Socratic" in intent that give students a direction to proceed, or highlights their error in thinking, or indicates a specific section of the reading material that defines or explains the issue. **We do not want to bypass helping students or frustrate them beyond their actual abilities, but we DO want to encourage their own responsibility and development of potential.** The basic philosophy is:

Help students less than they desire, but guide them to achieve more than they otherwise would.

2. Take an active role in getting students to form groups. Encourage or direct (i.e., "volunteer") students to work together in a group, although allow individuals to work alone if that seems best to achieve the course goals in their particular case. If two students are working separately on the same problem and one asks you a question, "suggest" that they go over and work with the other student so that they can build upon each other. Corral students at the board by pacing behind them.

3. At first, students will tend to stare blankly at the board or their paper trying to figure everything out. Urge/demand that they put down something definite. (A diagram is often best.) Don't let get by with talking through the details of a problem. Putting something definite down in writing forces them into an unambiguous decision, which highlights what they are actually thinking, be it right or wrong.

4. Use a modified Socratic method – don't nudge them into port as a tug would an ocean liner through constant small corrections. Otherwise, they will be less likely to find it on their own again. Whenever possible, refer students to written procedures for solving that class of problems.

5. Don't hover around students or be a tutor. If the students are humming along in their work and interactions, don't linger. Amble to another group or go out to get a drink of water. Do the same if someone is incessantly asking questions. It is too easy to step in or display hints by body language or self-insertion if you hover. But when students finally succeed, walk by and give a thumbs-up.

6. Try **not** to become part of the group solving a problem or discussing a point. Act more as a kibitzer who will enter the conversation when you think they are going too much astray, although this is sometimes difficult to judge. Try to keep a foot planted behind the group if you must enter into it, which tends to draw you back out of it when you are done.
7. When a student or group is stuck on a problem, look for a student who has already mastered it and “ask” the validated student to help the new group. Student becomes teacher – but you are always in the background, monitoring what is said and stepping in if necessary with a quick correction.
8. Stress beyond "advice" to students, in both the classroom and the learning center, the importance of the methodology and exposition of analysis as a very important component of their career success.
9. Let students make mistakes and discover/debate them amongst themselves. Be only semi-specific as to where you see an error or inappropriate reasoning track. Home in with greater detail when students truly have a blockage. Do not let them get away with small mistakes or make light of them, particularly in math. The learning center is an excellent venue to quash sloppiness.
10. Continuously convey solid commitment about standards, but display friendly caring about your desire to aid them in attaining those standards – if the student so chooses.
11. If you see an error, you should point it out (either when you first see it or let it go for a while as the person digs himself/herself in deeper). I do not think that saying "That's wrong" is sufficient without giving an indication of where something wrong appears. The student should be informed of the approximate location where a misstep has occurred, without giving a specific point (in general). You have to be the judge of what is best. For example, if there is an error in an equation, sign flip or incorrect sign usage or subscripts dropped, you can say, "Your equations are wrong" or "Your equations are inconsistent" – then point or touch with your hand the two equations that do not follow from one another; i.e., second equation does not follow from the first.
12. Feel free to give a mini-lecture to the side about a commonly misunderstood concept or technique. But avoid using an assigned problem to illustrate it. Let students make the connection.

The structure and dynamics of a LEAD learning center promotes all aspects of the *Seven Principles of Good Practice for Undergraduate Education* (<http://lead.mst.edu/sevenprinciples/commentary.html>) endorsed by the UM Board of Curators and the S&T Faculty Senate.

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