Learning Styles in Experiential Learning Environments: Core Seminar

“The thrill in teaching is learning yourself.”
~ Professor Grover C. Gilmore, Psychology

Seminar Description

Using the scores from the Kolb Learning Styles inventory (to be administered at the start of the session), you will learn more about your preferred learning style and how your style may impact your instructional approach with your undergraduate students. This seminar also will help you develop professional communication strategies.

If you did not take the Kolb, please contact Professor Olson-Hammer about a week before attending one of the Communication seminar sessions. You must arrange to take the Kolb Inventory before the seminar series. This appointment will take about 20 minutes for you to respond to the inventory and to score it. You will return the inventory to the ESS staff so that the Mentor TA Team will have your inventory to plan for the seminar.

For more information about the Kolb, check out these websites and feel free to make an appointment with Professor Olson-Hammer:
http://www.coe.iup.edu/rjl/instruction/cm150/selfinterpretation/kolb.htm
http://www.learningandteaching.info/learning/experience.htm
http://www.usd.edu/~ssanto/kolb.html

Seminar Objectives

- To assess your preferred learning styles as defined by the Kolb Learning Style Inventory
- To understand the nature of experiential learning as it relates to your TA role
- To discuss ways to use your knowledge of learning styles to plan and to interact with students according to your TA role(s)
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Learning Theory and Practice

A full, in-depth discussion of learning theories and modes would require far more space than is possible in this practical guide. Much research has been devoted to understanding the brain’s physical processes, the effects of environmental and innate physical factors, and the roles of personality and experience in learning. This research is still ongoing, and new discoveries are being made daily.

This section is intended to introduce some of the ideas that are currently employed in understanding learning processes and preferred learning strategies and to make you aware of some of their possible classroom uses. What is most important is to be aware that your students may be using different approaches to learning than you use and that there may be wide differences among these approaches. The explanations are, at best, preliminary: if you are interested in more information contact The University Center for Innovation in Teaching and Education (UCITE) 216-368-1224 [http://www.case.edu/provost/UCITE/index.html](http://www.case.edu/provost/UCITE/index.html).

Levels of Knowledge and Understanding

(Adapted from Teaching at Case Western Reserve: A Publication for Faculty Members)

Benjamin Bloom and his colleagues developed the most influential definition of various levels of understanding. Bloom’s taxonomy is summarized in a simplified form below:

1. **Knowledge** - recall
2. **Comprehension** - making use of knowledge in a limited context
3. **Application** - using abstractions of knowledge in concrete situations
4. **Analysis** - breaking knowledge into its parts and seeing relationships between the parts
5. **Synthesis** - putting components of knowledge into a new whole
6. **Evaluation** - making judgments about the value of knowledge, abstractions, or parts of knowledge

At the college level, most faculty members expect students to develop skills that allow them to perform satisfactorily up to at least level three on Bloom’s scale. Yet, we do not always explain our expectations to students in these terms or consider the progressive difficulty of these levels when constructing assignments. When you plan your course, consider which of these levels you want students to demonstrate and what level they may be operating at. For example, you may need to work up to an analytical assignment by making sure students can recall, use, and abstract the knowledge required to pursue the analysis.
Learning Cycles
(Adapted from Teaching at Case Western Reserve: A Publication for Faculty Members)

According to the “Experiential Learning” model developed by David Kolb at Case Western Reserve University, learning occurs through a cycle in which experience is internalized, conceptualized, and tested by the learner. The Kolb Learning Styles Inventory is particularly appropriate to consider because CWRU is committed to using the experiential learning model in both small and larger classes. The SAGES course sequence has specifically been created with the experiential learning model in mind. The components of the cycle are as follows:

- **concrete experience** (sensing)
- **reflective observation** (remembering or thinking)
- **abstract conceptualization** (idea explaining)
- **active experimentation** (testing)

The cycle can repeat endlessly and can start at any point in the cycle. Two other important aspects of Kolb’s view of the experiential learning cycle include the notion that learners test out their ideas in a current context and that the feedback they receive helps to change or modify what they have been learning. For example, a child who touches a hot stove

- **senses** the heat of the stove;
- **reflects** upon the experience by thinking about the pain which results;
- **develops an idea** to explain the experience, such as that it hurts to touch stoves;
- **tests the idea**, perhaps by putting a hand close to the stove without actually touching it or touching a different stove to see if the idea applies to all stoves.

This testing will lead to new experience or sensing, which will lead to new reflection, ideas, and testing. If the child touches a different stove and finds it cold, reflection may produce the idea that stoves are only painful to the touch when hot, or may encourage exploration of other sensory ways of determining whether a stove is too hot to touch.

**Thus, learning requires experience, reflection, conceptualization, and testing.** All of these experiences require the learner’s active engagement. All four elements of the cycle must be completed for learning to occur. Learning is a dynamic process generating change in both the learner and the world; this cycle represents the mechanism by which a learner experiences change.

You can make use of the learning cycle in your teaching by requiring students to work through all four steps of the process. For example, a lesson on visual art can require students to visit the Cleveland Museum of Art and view a modernist painting. After which, you can ask these students to describe in detail the elements of the work and hypothesize about what makes the
piece “modernist.” The students can then compare this work to other modernist works, and the similarities and differences observed can lead to more observations and hypotheses. A lecture too can also be an experience, but your challenge is to have students realize that a classroom lecture is only the first step in learning course material. Even simply teaching students about the learning cycle itself can enhance their learning as they come to understand their own activities at various points of the process and anticipate what they may need to do next.

**Learning Modes**

There are several ways of explaining individual learning preferences, and no one of the following theories is universally accepted. The three theories that follow offer different ways of understanding how individuals take in and process information.

*Remember that students have many different modes of learning. The best use you can make of any of these methods is to understand your own personal learning style and identify ways to adapt your teaching methods to accommodate modes quite different from your own.*
The Kolb Learning Cycle
(adapted from Teaching at Case Western Reserve: A Publication for Faculty Members)

These four modes are derived from the experimental learning cycle described above. Individual learners can be said to have a certain mode, as briefly described below:

Divergers

Divergers are imaginative learners who ask “why?” They favor concrete experience over abstract conceptualization and reflective observation over active experimentation. They are creative, active, extroverted, and intuitive as they pursue learning; but they may be scattered in their thinking and unable to see unifying hypotheses. Additionally, Divergers are interested in cultural diversity. Divergers will see many different angles in an experience but may be unable to develop a favored hypothesis or be willing to test actively any of those developed. Divergers may have professional interests in the arts and may major in humanities or liberal arts. Divergers are comfortable in considering multiple perspectives and they make sense of a learning experience.

Assimilators

Assimilators are theoretical learners who ask “what?” Assimilators favor reflective observation over active testing and abstract thinking over concrete experience. They prefer to develop abstract concepts rather than to pursue more experiences; they may be less interested in practical applications or new experiments deriving from their hypotheses and more concerned about internal logical consistency. Assimilators may be more interested in working on their own to gather (assimilate) information from a variety of resources in order to develop theoretical models and abstract concepts rather than learning from others.

Convergers

Convergers are pragmatic learners who ask “how?” They favor abstract thinking over concrete experience and active testing of their ideas over reflection. This mode is found in people who want to apply ideas and who excel in problem solving and decision making. Furthermore, Convergers seem to do best on problems or situations that require a single correct answer. In other words, students preferring this learning mode like to converge on a particular answer.

Accommodators

Accommodators are dynamic learners who ask “what if?” Accommodators prefer concrete experience over abstract thinking and active testing over reflection. They tend to be risk takers and action seekers; they may conduct many experiments based on some concrete experience without having constructed a reflective hypothesis. They tend to solve problems in a trial and error method and to rely on interactions with other people.
for new approaches rather than on analyzing a problem themselves. In other words, students preferring this style can accommodate differing contexts.

As students work through the learning cycle, be aware of tendencies to spend more time and attention at any single step. Do not discourage students from focusing on their favored elements—after all, pleasure can be a strong motivator to learning—but help them avoid getting stuck at any one spot. And guard against any tendency of your own to overemphasize one part of the cycle over the others; be aware of your own preferences and avoid slanting coursework toward them.
Myers-Briggs Type Indicator
(adapted from Your College Experience: Strategies for Success, Concise Second Edition)

Another approach to learning modes explores the basic personality preferences that make people interested in different things and draw them to different fields and lifestyles. The Myers-Briggs Type Indicator, based on Carl Jung’s theory of psychological types, uses eight basic types, shown here in their usual oppositions:

EI (Extroversion/Introversion)

This scale describes two opposite preferences depending on whether you like to focus your attention on the inner or outer world. An Extroverted type learns through action and interaction with others; an Introverted type learns through reflection and individual contemplation.

SN (Sensing/Intuition)

This scale describes opposite ways you like to acquire new information—that is, whether you find out about things through tactile sensing and observing specific events, or through intuitively assessing things and drawing conclusions that do not rely on hard data.

TF (Thinking/Feeling)

This scale describes how you make decisions, whether by analysis and weighing of evidence or through your feelings.

JP (Judging/Perceiving)

This scale describes the way you relate to the outer world, whether in a planned, orderly way or in a flexible, spontaneous way.

Of course, no one is wholly a sensing type or wholly an intuitive type. Most people simply tend to use one approach more often than another, sometimes varying their focus as the needs of the situation vary. These types combine into thirty-two possible combinations that contribute to the learner’s overall personality.

The Myers-Briggs theory uses a Personal Style Inventory (available from UCITE) to determine a learner’s relative emphasis within each of the four oppositions and to identify the particular four-letter combination which comes closest to accurately identifying that individual’s overall preferred styles. Understanding these characteristics can help an instructor work with students,
too. For example, you may recommend that an Extroverted student form a study group rather than trying to review material alone or recognize that an Introverted learner gets a great deal out of listening to discussion without actually speaking up.

**Visual/Auditory/Tactile/Kinesthetic**

(adapted from *Teaching at the University of Virginia: A Handbook for Faculty and Teaching Assistants*)

These four learning modes are derived from the ways in which learners sense information most effectively. Most learners are capable of using all four methods to take in new ideas but will tend to favor at least one to some extent.

**Visual Learners**

*Visual learners best understand and remember what they see.* They often take copious notes in class and write main ideas when studying. They may invent charts and diagrams to learn new information. Visual material such as outlines, illustrations, graphs, lists, and handouts will be very helpful to them, as will encouragement to draw or write information while studying or completing graded assignments and tests.

**Auditory Learners**

*Auditory learners prefer to hear new ideas and information.* They may whisper to themselves or to classmates, concentrate intently on a lecture, or read aloud or repeat material over when studying. Auditory learners can learn well through study groups in which students discuss material aloud, listening to tape recordings and films, and focusing on lectures and spoken material in class.

**Tactile Learners**

*Tactile learners favor touching objects to feel their shape or texture.* They may major in subjects that enable them to work with their hands and will learn better when they can physically touch or hold items under discussion.

**Kinesthetic Learners**

*Kinesthetic learners learn best when engaging in a physical activity.* They may trace outlines of geometric forms, connect certain body movements with specific ideas, or rely on the physical act of note-taking to remember information. Physical experimentation and activities which require students to move around in class can help kinesthetic learners process information more effectively.
You can incorporate all four types of learning into lesson plans and course assignments. Accompanying a lecture with slides or transparencies will help both auditory and visual learners retain the information; having students build three-dimensional models of structures or write formulas can enable kinesthetic learners to grasp principles under discussion. Avoid heavily relying on any single one of these aspects.

** Asking and Answering Questions **

The process of asking and answering questions is the basis for all interaction with students. Students will be curious about how you respond to questions. If you have a less-than-positive attitude about answering those first few questions, students will stop asking.

Here are some useful techniques to help you answer and facilitate questions:

- While you can field questions as they come, you may want to write them on the board or overhead so that you can organize your approach to answering them.

- In a large lecture hall, repeat the question before answering it.

- When you ask a question, allow some time to pass for students to prepare an answer. Some seasoned teachers recommend waiting at least 10 seconds before asking the question again, perhaps in a different format. If you answer your own questions because you are uncomfortable with silence, you will soon train students to sit and wait for your answers. If you wait for answers, often students’ responses will be thoughtful. And once they do respond, you may ask for students to elaborate or encourage other students to add on to the response.

- Some instructors use a participation grade to ensure that students will speak. That policy is difficult to carry out in a small class and impossible to do in a large class. You can ask your students to bring to each class study questions concerning material they are to read and base your participation grade on these questions. Ask students to bring these questions typed (perhaps one copy for you and one for them) and collect them at the beginning of each class. You can also ask students to respond to questions about the reading assignment on Blackboard before class.

- If a student answers a question incorrectly or slightly off course, respond with a statement that indicates that you appreciate the response but that some aspect of the response requires some consideration and amendment to it. Ask other students to help reshape the answer.

- If you have students who frequently ask questions that are not on target with the class, make a point of writing down the question and letting the students know that you are recording the question so that it may be addressed later either in class or
outside of class. You can state that you appreciated the question, but at the moment, it would be better to delay answering that question until specific material is covered or until after class.

- Ask how and why questions rather than what or who in order to promote reflective thinking about the material rather than just a regurgitation of material discussed in a previous class. Students are easily turned off from discussions that do not provide some challenge and level of engagement.

- If a few students appear to dominate the discussion, you may decide to pair up students, perhaps partnering the more talkative students with those a little more reserved. Ask the pairs to respond to a set of questions that you will discuss with the entire class a little later in the class. When the report-out begins, you may ask specific students to share what they discussed in their small groups. The students you ask to report may include those students who do not always volunteer.

- Consider learning styles and where you are in the material. If you are beginning an instructional unit, you may want to begin with focused questions that help students define and organize information. Focused questions help direct learners to shape definitions and concepts; to seek feedback about what they do or do not understand; and to connect together parts of a concept, strategy, or idea. Another approach is to use brainstorming to consider the possibilities that an instructional unit might hold. You may also think about what they have already learned so you may adjust your expectations of how to deliver the information. This strategy may enable the students to see connections between this new information with what they have learned or will learn.

- As you are working through the material, you may wish to ask both focused and broad questions. The latter type of questions may include those that predict outcomes or consider students’ perceptions and observations about the material. Broad questions ask students to take a step back from the instructional moment to see how this current information may relate to other material, to take the immediate example and form a generalization that may be applicable in other situations, or to consider where the material might lead them next.

- As you conclude an instructional unit, again you may ask both focused and broad questions to help students increase their understanding of key concepts. This approach might also help them conceptualize the material in comparison with information they have learned previously.
Learning Styles: Student-Centered Learning

Course preparation includes everything from designing a course from scratch to signing on for a section of a course your department offers each semester. If you are planning a new class, start as early as possible to make sure your ideas fit smoothly into the needs and structure of a semester. Even if you are instructing or assisting with a class in which the textbook, assignments, and exam schedule have already been decided, you should still ask yourself the following questions before the semester begins.

Is your course plan content-driven or student-driven?

Many instructors plan their courses based on content. They know that they want to teach certain material. Next, they work out a syllabus and a teaching plan focused on the amount of material to be presented, the depth and the breadth of the coverage, and the texts and other material needed for conveying the information. This approach can produce an interesting, even rewarding course. But in planning in this manner, you also risk overlooking the students’ needs and goals.

With a student-driven plan, you will ask such questions as the following:

- What skills do the students have as they begin the course?
- What skills will students have gained or improved upon by the end of the course?
- How will the students apply what has been learned in this course to future classes or professional activities?
- What are the students’ expectations of the course?

By asking questions like these as you plan, you can design a class that covers the material you want to cover in the most effective way for both you and your students.

What do you expect students to learn? Do assignments encourage and evaluate that learning appropriately?

Of course, the simple answer to the first question is “the material we’ll be covering,” but students learn much more than a specific body of information in every class:

- They learn intellectual skills such as critical thinking and clear writing.
- They learn the norms of certain academic disciplines or professions, as well as successful habits of mind and work.

You should decide what students in your class need to do (other than only mastering the material), and then plan your class activities, graded assignments and tests accordingly. For example, if you want students to present coherent arguments about the subject matter, then structure activities requiring discussion or debate, and evaluate those exchanges thoroughly. If
critical reading is one of your goals, give assignments requiring more than simple recall of information from the text.

**What is the purpose of this particular course/section? How does it fit into the curriculum? Into students’ education?**

Find out how your course corresponds with the other courses in your department and to let your students know where your course falls in the departmental course offerings. You might teach skills that are fundamental to more advanced courses or offer a chance to study a fascinating but uncommon topic. The questions to ask are the following:

- Is your class an introduction to the rest of the classes in the department?
- A required prerequisite to advanced study?
- A core requirement of the university?
- An optional elective?

**What is the history of this course?**

Even if you have never taught it before, your course may have a long and established history among students. It may be dreaded or loved, or you may find yourself following in the footsteps of an excellent or an inadequate instructor. To avoid getting tripped up by students’ preconceptions or unrealistic expectations, find out about your course by talking to colleagues or reading previous semester course evaluations. Past evaluations may be accessed on the University’s web page at [https://www.case.edu/courses/evals/evals.html](https://www.case.edu/courses/evals/evals.html). In addition, print versions are kept on permanent reserve at Kelvin Smith Library.

**What ideas and information do students bring? How will you evaluate their preparation? If students are unprepared, how will you remedy that?**

Student preparation varies widely; first-year courses are full of students whose high school preparation may have been barely sufficient or very advanced, and students in upper-level courses may not have retained everything they learned in their preparatory sequences at the University. Within the first week, evaluate how well your students are prepared, perhaps by giving some pre-tests or by requiring a writing sample. If a large number of students are insufficiently prepared, you may want to spend a class session reviewing key material; if only a few are under-prepared, you may want to work one-on-one with them yourself or direct them to appropriate help, such as the Writing Resource Center (WRC) or Educational Services for Students (ESS).

Consider, too, what misperceptions your students may have about your subject or about how to learn it. For example, students may think that they need to learn all their information by studying on their own and faithfully attending lectures, and they may consider the classes as optional. They may think that asking questions is a sign of weakness that will hurt their image in the class. Or they may view teachers as all-powerful providers of the right information and
the right answers and may become confused or even upset when teachers pose open-ended questions or present problems without right solutions.

**What natural thematic or conceptual divisions are there in the course? How does the course divide logically into manageable units?**

Students need to know both the individual details of any course and the overall theme or principle to be learned. A syllabus without clear and logical movement from one idea to another will appear to the student as a bewildering mass of information too huge to be assimilated at once. **Be explicit about the logic of the organization of the course.** You know the subject better than your students do; connections that seem obvious to you may completely escape your students if you do not point them out.

**What are your own learning and teaching styles? How can you plan your teaching to use of your own style while recognizing and meeting the needs of students?**

How do you prefer to process information? How do you prefer to explain it? Being aware of your personal style can help you recognize how it influences your teaching. Being aware of alternative styles can help you teach students who handle information differently than you do. It is important to vary your teaching so you do not rely on only one or two ways of learning. A class that is all lectures or all visual demonstrations will be more difficult for students whose styles do not favor such presentations. Learning styles are described in greater depth in the Communication Seminar section of this TA Manual.

**How will you assess progress throughout the course? What kinds of assignments and activities are appropriate for the course?**

Students can learn course material through lecture, discussion, reading, field trips, working with guest speakers, or viewing of films; they can demonstrate their understanding of course material by successfully completing tests, papers, quizzes, group and individual projects, and presentations, among other tasks. Which of these you use will depend on your course goals, the size of the class, and the nature of the subject matter to be covered. You should decide how you will measure student comprehension and how often you will do so. Find out early on how students are doing; do not wait until midterm, when it is too late to deal effectively with a class that is not mastering the material.

**How can assignments best meet students’ needs while effectively teaching the material?**

If students have limited experience with the ideas presented in your course, the students may not be motivated to investigate them. Information that is broadly abstract may interest some of your students, but many others will fail to see a connection to their own interests and their lives.
Connecting these abstractions to specific details that draw on students’ own experiences or demonstrated interests will motivate them more effectively. Students who are in the pre-medicine program will be interested in examples from medicine; political theories can be explained in the context of student governance.

What is your class size? How will that affect assignments and grading?

The smaller the class, the more individualized attention you can give to the students; the larger the class, the less you can give. Plan assignments in order to make best use of that attention, rather than just keeping your paperwork load manageable. A survey class may be too large to assign more than two substantial papers per semester. You may need to find more effective ways to measure student understanding, such as frequent quizzes or short un-graded essay responses to an in-class question.

What resources do students have outside of class? Do your assignments require them to use those resources?

Students must realize that real learning takes place outside the classroom. Ultimately they must rely on their own recall and research techniques rather than on memorization of what they have been told in the classroom. You should be willing to direct students to the libraries, reference books, handbooks, workshops, agencies, or other resources that they can use to teach themselves. Further, you should incorporate these resources into your class, both by showing students how to make effective use of them and by assigning work that requires them to draw on those resources.

What is a reasonable student workload?

A common rule of thumb is that students can expect to spend two hours studying outside of class for every hour spent in class, which means that if your class meets two and a half hours per week, students should average five hours of study and homework. However, it is difficult to plan around such a figure, because every student works at a slightly different pace. First-year students tend to struggle under course loads that upperclassmen find reasonable; slow readers spend disproportionately more time studying than fast readers do. Ask your colleagues about how they plan course workloads, and be prepared for some variation.

What sources will provide the course material?

Typically, instructors choose textbooks for their courses and order them through the Case Western Reserve University Bookstore for students to purchase. Not all students, however, will purchase every book—either because they cannot afford to, or because they do not expect to keep the books after the semester has ended. Consider putting copies of the bookson reserve at Kelvin Smith Library. Reserve forms are available at the service desk or online at http://library.case.edu/ksl/index.html.
If you are using articles in class, you may wish to distribute copies in class or make copy sets available through the bookstore. You can also put articles on e-reserve through Kelvin Smith Library, with the expectation that students will read the articles as assigned. Or you could post the articles on Blackboard, an online system that allows you and your students to stay connected between classes, submit or return assignments, and post comments about reading assignments.

If you intend to use audio/visual material in class, plan early to ensure the equipment you need is available. Many departments have their own overhead projectors, slide projectors and screens, VCRs, laptop computers, and LCD computer projectors for use by faculty and TAs. Projection equipment can also be obtained from MediaVision (the Audio/Visual Services department at Case Western Reserve). Contact MediaVision at (216) 368-3777 or http://www.case.edu/its/itac/mediavision/.
Lesson Plans and Lab Plans

Whether you are in the classroom, the lab, or even meeting with students in an office setting, planning should be part of the process.

For the classroom, using a binder is an efficient way of keeping track of all of the materials that you will need for teaching, including lesson plans, handouts, homework assignments, etc. Often, students may ask you for extra copies of materials before or after class. With a binder, you will have easy access to these materials when you need them.

Begin class on time, even if a number of students are not present. If you wait for students to arrive, you are signaling to those who were on time that they do not have to be on time from here on out. At the same time, plan your class or lab so that you stop at the appointed time. If you do not finish class or lab in time, students often become anxious and begin packing up prematurely.

Lesson plans

Review previous course material

Be sure to allow for time for this segment of the class. This time spent will help students make the connections they need to master the course content. However, if a student asks an involved question and you sense that most students understand the concept, gently invite the student to meet with you after class.

Create an outline of what will be accomplished during class

Students like to know what will happen in class, especially if it is a long class. Students quickly grow impatient with teachers who continually run over class time. As you plan the lesson, consider how much time each activity might take.

Pose questions for the lecture

Being spontaneous is good, but because questions are what help move students through a learning process, plan out your key questions and where you might insert them into the lesson plan. Consider the most logical sequence for your questions.

Divide the lesson into 10 or 15 minute parts

Students may lose interest very quickly; they expect to be involved in the class in a meaningful way. While you may sacrifice some content for more student involvement, students will learn the material more thoroughly if you break class time into shorter segments.
of ways to test your students’ understanding of smaller chunks of material without using the traditional pop quiz:

- Break students into pairs or small groups to respond to a problem that uses the material just covered. Encouraging students to try out the information that you just presented helps you to assess how well students are learning this material. To encourage student participation in these small group activities, offer extra credit or state that the questions/problems covered in these activities will be similar to exam questions.

- Ask students to report their work/answers individually on sheets of paper that are collected at the end of class or orally through a class discussion.

- Begin a new segment with a scenario that addresses some of the issues about to be discussed (if the content lends itself to that approach).

- Invite students present information or do problems with everyone helping with their work so that they do not feel too much in the spotlight.

Use wrap-up activities to reinforce the main ideas of the lesson

As with the introductory activities, wrap-up tasks should not be rushed. Use this time to clarify or adjust assignments and set expectations for the next class, assignment, exam, or project. Furthermore, you might use this time to ask students to respond to a one-minute paper or a short assessment question. A sample prompt may ask students to consider what they felt was the main idea of the lecture, what they saw as unanswered questions regarding the material covered in class, or what they felt went well in class and what needed to be changed.

These one-minute papers will help you gain insight into students’ perceptions of your class. This information is especially helpful the first few weeks of class when students are forming their impressions of the course.

Lab Session Plans

Offer a brief introduction

Cover the purpose of the lab, demonstrate the procedures and equipment, and emphasize any safety precautions. Do not spend too much time on the introduction. Include a review of related concepts from the lecture and how these concepts relate to the lab.

Outline what students should do during the lab, including:

- the sequence of steps in the lab
- what they need to observe, draw, record, or take note of
- what they have to hand in afterwards
Ultimately, lab time is active learning time. If a lab requires a longer introduction, you may want to work with students in small groups rather than addressing the entire class at once.

**Manage group visits**

During the lab, move from group to group. Do not spend time chatting with other professors or TA’s or spend too much time assisting one student. You should visit every group, pair, or student at least once if not two or three times a lab. Interact by asking pointed questions that require students to take their thinking one step further. If students have questions for you, refrain from just feeding them the answer. Instead, ask leading and focusing questions in an effort to guide them to the answer.

If students look confused, do not wait for them to ask a question. A simple “What stage are you at?” or “How is it going?” will help you check on their progress and give them an opening to ask a question. At the same time, do not intimidate students by asking too many questions or by hovering over them.

If you do not know or are unsure of the answer to a student’s question, say so and then find the answer by consulting a colleague or a textbook. Never try to hide what you do not know by giving a confusing or muddled reply. Furthermore, never give students the impression that they have asked an unintelligent question. Finally, be sure to show your students respect and cooperation by being approachable.

**Incorporate short breaks**

Consider stopping lab once or twice (if possible) to cover key individual questions that might be helpful to all students, to watch a demonstration, or to discuss concepts and procedures.

**Emphasize Connections**

Draw connections/relationships between the experiment (or procedure) and concepts. Ask students to tell you how the lab relates to concepts learned in class.

**Discuss results**

If students’ results are not as expected, encourage them to speculate on what caused the deviation.
Conclude the lab session

As students leave, make sure that they have kept their workplace clean and put the equipment away properly. As you leave, do a routine check: lock the equipment; check the air, gas, and steam taps; turn off the lights; and then lock the laboratory.

Additional Resources
