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Teaching and Learning **in Physical Therapy**

FROM CLASSROOM TO CLINIC

MARGARET PLACK
MARYANNE DRISCOLL

SLACK Incorporated

Systematic Effective Instruction

Keys to Designing Effective Presentations

Chapter Objectives

After reading this chapter, you will be prepared to:

- Design effective needs assessments to ensure your presentation meets the needs of your learners.
- Develop appropriate learner-centered objectives in 3 domains of learning to guide your presentation.
- Differentiate between designing single presentations versus presentations linked to a course or a curriculum.
- Create effective motivational hooks and content boosters that capture your learners' attention and maintain it while reinforcing learning.
- Determine how best to sequence a presentation to optimize engagement and learning.
- Select active learning strategies that will engage your learners, reinforce their learning, and enhance their retention.
- Design formative and summative assessments to enhance teaching and learning.

Have you ever had to give a morning presentation to a class when they were having their anatomy midterm that afternoon? Have you ever had to give an in-service to a group of therapists during lunch on a very busy Friday? Have you ever had to do a presentation on Monday at 8 AM after a holiday weekend? Finally, have you ever sat through a lecture and halfway through realized you had been daydreaming and totally missed what the presenter was saying? In this chapter, we will provide you with strategies that will help grab your audience's attention and maintain it throughout your

presentation, no matter what the content or when you might be presenting!

Stop and Reflect

You have been asked to put on a presentation about osteoporosis for a community-based women's group. The presentation is set for next month.

- What factors will influence your preparation?
- How will you decide what to teach?
- What teaching-learning activities will you use?

In responding to the scenario presented above, you may have remembered, and reflected on, the various filters that influence the teaching-learning process presented in the first chapter. You may have considered the cultural background and generational status of the audience, as well as learning styles and characteristics of the adult learner. Next, you may have thought about your topic, osteoporosis, and what you know about it. Remembering that any new information must connect to prior knowledge, you may have reviewed some facts about osteoporosis that you learned in school. It is possible that you also remembered that your aunt was diagnosed recently with osteopenia, a precursor to osteoporosis, and that your grandmother had broken several bones due to osteoporosis. Having these episodic or autobiographical memories about your relatives arrive unprompted makes sense to you now that you know how the various memory pathways work together. Certainly your grandmother's story had an emotional

Table 4-1. Keys Tasks to Consider in Preparing a Presentation

- Assess the needs of the audience
- Design learner-centered objectives
- Define the specific content
- Create motivational hooks
- Utilize content boosters
 - Action learning strategies
 - Guided practice
 - Independent practice
- Develop formative and summative assessments to check for understanding
- Summarize the key points

Adapted from Hunter M. *Mastery Teaching*. Thousand Oaks, CA: Corwin; 1982; Garmston RJ, Wellman BM. *How to Make Presentations That Teach and Transform*. Alexandria, VA: Association for Supervision and Curriculum Development; 1992; Silberman M, Auerbach C. *Active Training: A Handbook of Techniques, Designs, Case Examples, and Tips*. 3rd ed. San Francisco, CA: John Wiley & Sons; 2006.

impact on you, and you may wonder how you can help your audience connect in a similar way. The topic, osteoporosis, becomes a stimulus for anything you connect with that word.

In addition to reflecting on some of the topics presented in the previous chapter, the first question a novice presenter often wants answered when asked to speak on a topic is, “How much time will I have?” This question may be followed by, “Who will be in the audience?” Although these questions address factors that are important, they are insufficient to determine how to best design an optimal teaching-learning activity. As you can see from this discussion, when asked to do a presentation, intuitively, you may begin to consider many of the concepts presented earlier in this text. You may not yet recognize all of the steps needed in preparing for a presentation, however. Whether you are doing a guest lecture in a doctor of physical therapy class, speaking to a community group, or instructing a patient, there are a number of essential steps to be considered when you are preparing to teach.

This chapter describes a comprehensive, systematic approach to instruction that includes assessing the needs of your audience, gaining their attention, and presenting appropriate content that meets the objectives you have specified ahead of time. This approach incorporates periodic assessments, practice opportunities, and a summary. Because we know that we are more likely to learn and retain information more effectively when multiple memory pathways are engaged, we will emphasize the importance of active learning, using teaching strategies that are multidimensional and interactive. These concepts will be reinforced in later chapters as you begin to see how these very same steps are not only important for classroom or community presentations but effective in planning patient education activities as well.

What to Consider in Preparing to Teach

Critical Thinking Clinical Scenario

Consider these 2 scenarios:

1. You are preparing to teach a class on manual therapy to a group of doctor of physical therapy students.
2. You are preparing to teach your patient an exercise regimen for strengthening his lower back.

Reflective Questions

1. What do you need to consider in preparing to teach in each of the above scenarios? Develop a list for each.
2. How do your lists compare? What is similar about the 2 lists, and what is different?

What did you include in your list of things you need to consider? Most likely, you mentioned the content and the goals or objectives for your topic. Perhaps your list includes providing an opportunity for your participants to practice the skills you taught along with an opportunity for you to observe them practicing to see how well they learned the skills you presented. However, planning for optimal learning, as Fink¹ described, requires us to be even more comprehensive in our approach. We need to consider what the audience already knows about the topic and how to engage the learner’s attention, boost content, provide for different types of practice, summarize content, and periodically assess mastery of what we have taught. Table 4-1 contains a list of tasks considered essential to preparing presentations.²⁻⁶

Knowing Your Audience and Assessing Their Needs

Critical Thinking Clinical Scenario

Revisit the scenario presented at the beginning of this chapter in which you are giving a presentation on osteoporosis to a group of women in your community.

Reflective Questions

1. How would you approach the task if you knew that everyone in the audience had osteoporosis?
2. How would you adapt your talk if you knew that the average age of members in the audience was 20?
3. Would it matter to you if the average age was 60? If so, how? What would you add to your talk? Delete?
4. Would you do things differently if you were told that the audience was composed of health care workers, including nurse practitioners, who were interested in how to incorporate exercise into the recommendations they usually give to women? How would you modify the content?
5. What if your audience was composed of doctor of physical therapy students learning about osteoporosis in an advanced orthopedics course? How might your content differ?

Who Is in Your Audience?

After reflecting on, and responding to, the Critical Thinking Clinical Scenario above, it becomes clear that it is important for you to consider your audience and their needs before planning the content you wish to teach. You might describe different strengthening exercises for 25 year olds than you would for 60 year olds. You might include more information about physiology and kinesiology when presenting to health care practitioners or doctor of physical therapy students than you would for an audience of laypeople. Given what we know about the brain and how neuronal connections are developed based on our prior experiences, it makes sense to learn as much about an audience as possible before designing a teaching-learning experience. In learning about your audience, it will be important for you to recognize and consider the following:

- Learning styles of your audience members
- Level of expertise (ie, novice to expert) of your audience
- Expectations of your audience

What Kind of Learners Are in Your Audience?

Even before conducting an actual needs assessment, we can make some general assumptions about the individual members of the audience. As we learned from our discussion on learning styles in Chapter 1, a presenter should generally expect that all 4 learning styles will be represented in every audience. Without doing a formal assessment of each individual's styles, you can assume from Kolb's⁷ work that in any audience, some learners will prefer to watch and listen, whereas others might prefer to be active in the learning experience. At the same time, you will likely have participants who primarily want theory and facts, whereas others might prefer concrete examples, anecdotes, and stories. The optimal teaching-learning experience includes something for each preference, which, if you remember, is the basis for our motto "Teach Around the Wheel"!

Garmston and Wellman³ provided us with a slightly different view of the audience than Kolb.⁷ In any given audience, they too encourage presenters to be cognizant of the presence of 4 different types of learners. They described each type of learner as focusing on a different question. As a presenter, you will want to be sure to answer the questions posed by each. Garmston and Wellman³ actually gave names to each of the different types of learners:

- The "scientist" wants to know *why* he or she should pay attention to you; what is the personal connection for him or her?
- The "professor" wants to know *what* is important, what are the facts, the objective information you are presenting.
- The "friend" seeks the *so what* or implications of what you are teaching on his or her physical well-being, job, or other relevant factor.
- The "inventor" will listen to your presentation with the perspective of *what if*; how can this information be adapted and reorganized to better meet my, or someone else's, needs?

As you think about your topic, if you can imagine people asking these questions, you can begin to organize your content to answer the questions of the different types of audience members and in this way satisfy the needs of each learner.

Key Points to Remember

Every audience will likely have individuals who prefer:

- To watch and reflect
- To experiment and be active
- Concrete examples and practical application
- Theoretical and abstract concepts

Every audience will likely have individuals who will want answers to specific questions.

- The "scientists" in the audience will want to know *why*?
- The "professors" in the audience will want to know *what*?
- The "inventors" in the audience will want to know *what if*?
- The "friends" in the audience will want to know *so what*?

What Is the Level of Expertise of Your Audience?

The level of expertise of your audience is another factor to consider in determining the actual content you will present. How much does your audience already know about the topic? Will you be introducing a topic to your audience for the first time? Pat Benner⁸ is commonly cited in health care literature for her research on the novice to expert continuum. In her seminal work on the development of expertise in nursing, "From Novice to Expert," she first described the Dreyfus Model of Skill Acquisition.⁹ Jensen et al¹⁰ used this same model in their study of *Expertise in Physical Therapy Practice*. Dreyfus et al⁹ proposed a 5-stage model of skill development:

1. *Novice*—Has no experience with the content, skill, or situation; this learner relies on rules and input from others to guide learning and performance.
2. *Advanced beginner*—Has some exposure to or experience with the content and is just beginning to develop competence; this learner is less rule governed than the novice but still relies on others for guidance; this learner continues to need help in setting priorities and recognizing the important aspects of a given situation.
3. *Competent*—Has some exposure and experience with the content and as a result has developed some degree of competence; with greater experience than the advanced beginner, this learner can begin to rely less on abstract rules and more on applying the information to make decisions in a given context; at this point, the competent learner can prioritize information and effectively apply the information to a variety of situations.
4. *Proficient*—Has the ability to view the situation as a whole; these learners rely on past experiences to

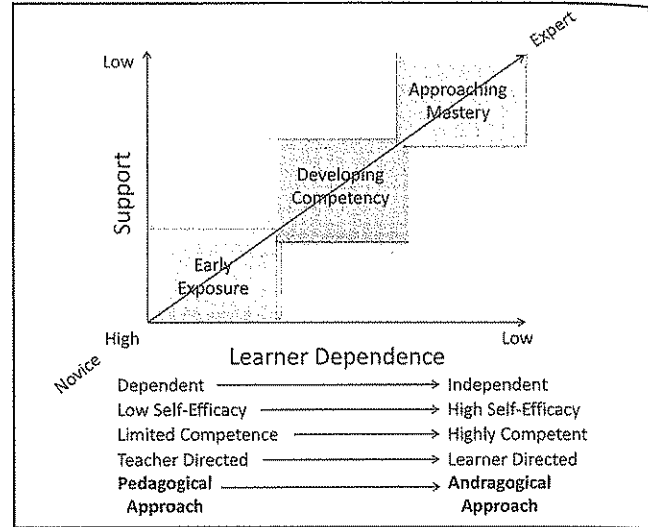


Figure 4-1. Novice to expert continuum.

help them recognize patterns so they can quickly see when something does not fit the pattern as expected; unlike the learner in the competent stage, the proficient learner has enough experience to determine what aspects of a situation are most important.

5. *Expert*—Has had significant exposure to and experience with the content and no longer relies on abstract rules; this learner can quickly discern a situation and know when to take action; given this learner's depth of understanding and experience, he or she relies to a large extent on intuition.

Understanding where along the continuum your learner's abilities and experiences fall will help you determine how to approach the teaching-learning situation. Figure 4-1 provides a pictorial view of the novice to expert continuum based on the work of a number of adult theorists including Philip Candy,¹¹ Malcolm Knowles and coworkers,¹² and Daniel Pratt,¹³ as well as the work of Pat Benner.⁸

Figure 4-1 demonstrates how learners at the novice end of the continuum (ie, during early exposure) show a low level of competence and self-efficacy in the subject matter and therefore may be dependent upon direction from the teacher and require a great deal of support in their learning. As a teacher, you will likely provide them with significant content information; you may take a more pedagogical approach and provide a great deal of structure, guidance, and supervision. As the learner develops some degree of competence, you may begin to provide less structure and direction and more guidance and feedback; you will want to provide more opportunities for independent practice, complex problem solving, application, and integration. Finally, if you are presenting to an audience of individuals with a

high degree of competence, your role as an instructor would be to design a learning situation that requires the learners to actively integrate the information into what they already know. Your presentation may require your learners to be more independent and self-directed in their approach. For example, you may structure your presentation around a complex case study and require your learners to take greater control through independent research and problem solving. You may also ask your learners to reflect on the content, asking them to apply the information to a variety of situations in more creative and novel ways.

For example, the concept of strength training for people in their eighties may be new to someone unfamiliar with the latest research on the benefits of exercise for elderly individuals. If this were the case for your audience, the purpose of your presentation would likely be early exposure to the topic, and you would likely be providing basic information; discussing indications, contraindications, and various types of strength training activities; and using interesting case material to demonstrate the principles discussed. As the instructor, you will need to provide more structure and supervision.

On the other hand, perhaps your audience members have been exposed to the topic of strength training in the elderly already and they now want to develop competence in designing appropriate programs for residents of an assisted-living facility. In your presentation, you will more likely be guiding your learners through interactive discussions and practice with a variety of strength-training activities; you may guide them through a variety of case studies and use guided practice to help them develop exercise protocols for individuals with various health conditions.

Finally, if you are conducting an advanced continuing education course for master clinicians or experts, you may challenge your learners to apply and integrate the information to plan interventions for more complex geriatric patient cases such as adults with intellectual developmental disabilities. You will likely use small group problem-solving activities to draw on the experience and depth of understanding of your audience members.

It is important to remember that you can have learners who have achieved a significant level of expertise in one content area yet still be novices in another. As the instructor, understanding where along the continuum your learners' knowledge, skills, and experiences are relative to the content you will be teaching is critical in designing your presentation.

Key Points to Remember

As learners develop expertise, they will move from novices to experts along the continuum of:

- Early exposure
- Developing competence
- Approaching mastery

At each stage along the continuum, learners have different needs; therefore, teachers have different roles:

- Early exposure
 - *Learner needs:* Looking for details; they are dependent on the instructor for content; they require close supervision and structure.
 - *Teacher role:* Providing information, structure, and needed supervision.
- Developing competence
 - *Learner needs:* Ready to participate and actively engage with the material (eg, guided practice) and can begin applying it to practice.
 - *Teacher role:* Guiding your learner through practice and feedback.
- Approaching mastery
 - *Learner needs:* Interested in integrating the material into daily practice and activities to solve increasingly more complex problems.
 - *Teacher role:* Challenging the learner to independently apply and adapt what has been taught to his or her own practice and to complex and novel situations (eg, problem solving, independent practice, and creative utilization).

What Are the Expectations of Your Audience?

Stop and Reflect

Have you ever gone to a presentation and walked out thinking, "How disappointing, that was not at all what I expected to hear"?

- How did this mismatch occur?
- How might this mismatch have been prevented?

It is also important that your planned presentation and the expectations of the audience are congruent; otherwise, you may very well disappoint your audience and leave unsatisfied yourself. In presenting to any audience of adult learners in particular, it is important to remember that they want to know:

- *What* they will be expected to learn.
- *How* learning will occur and *how* it will be evaluated.
- *Why* it is important for them to learn what you are teaching.
- *Who* the teacher is and what qualifies him or her to teach the content.

Key Points to Remember

Adult learners will want to know:

- *What* they will be expected to learn.
- *How* learning will occur and *how* it will be evaluated.
- *Why* it is important for them to learn what you are teaching.
- *Who* the teacher is and what qualifies him or her to teach the content.

A personal introduction will help the learner understand who you are and what makes you qualified to teach him or her. Creating a plan and goals for your presentation and making them explicit to your audience during the introduction will help them understand the purpose of your presentation and why it is important. It will also give them a sense of what you will expect from them as learners during the presentation. But perhaps most important in designing a presentation is clarifying the needs of your learners. Designing your presentation around their needs will both motivate your learners and add to the success of your presentation.⁶

What Are the Needs of Your Audience?

Once you have considered the audience in general, it is time to get more specific and learn as much as you can about the needs of the individuals who will participate in your learning experience. The needs assessment is the next essential step in developing an effective presentation. Conducting some type of needs assessment will allow you to tailor your presentation to best meet the needs of your learners. The needs assessment can also help you learn more about what people *want* to learn about the topic, their prior exposure to the topic, their preferred methods of instruction, as well as the time of day and location for instruction (eg, staff lounge versus library). The more information you have about the audience, the better you can customize your instructional design.

Ideally, your needs assessment should be done ahead of time. Taking the time to determine the needs of your audience members shows them you care and can help you build a relationship with them before you even

begin presenting. By gathering the information early, you can also obtain specific examples or case material relevant to your audience members, which may also build interest and motivate them to participate in your presentation. Talking with your participants ahead of time may help you refine your content and mode of delivery or even make you decide to change your topic all together. In some instances, the information gleaned from a needs assessment can help determine whether your presentation is even necessary or feasible.⁶

Key Points to Remember

Needs assessments may help you:

- Build relationships with your participants.
- Build interest in and motivation for your topic.
- Obtain specific and relevant case material to support your presentation.
- Determine the feasibility and applicability of your topic.
- Refine your content.
- Refine your method of delivery.

Needs assessments are beneficial in all teaching-learning situations. Clinicians routinely do needs assessments on their patients. For example, when developing appropriate home exercise instructions, the experienced clinician uses knowledge of the patient's daily activities, personal goals and current level of activity, and information obtained formally or informally through prior interactions with the patient. Without labeling it a needs assessment, the clinician uses this background information to design a more effective home exercise program.

How Will You Assess the Needs of Your Audience?

There are numerous approaches to conducting needs assessments prior to meeting with your participants.^{4,6,14} Garmston and Wellman³ recommend an in-person or telephone conversation between the presenter and a number of key participants who may have different perspectives on the topic to be presented. In this era of Internet ease, an on-line discussion about these topics among representative participants and the instructor could easily substitute for an in-person conference or phone call. Table 4-2 provides sample questions you might ask during this phone conversation to determine the needs of your audience.

Wlodkowski⁴ and Silberman and Auerbach⁶ described a variety of needs assessment techniques. A list of sample strategies, adapted from both Wlodkowski⁴ and Silberman and Auerbach,⁶ along with an example of how each might be applied in physical therapy or in the health care arena appears in Table 4-3.

Table 4-2. Sample Needs Assessment Questions

<ul style="list-style-type: none"> • Who are the participants? • What is the composition of the audience in terms of roles and possible attitudes toward the topic? • What is the audience's prior exposure to the topic? • What is their experience with the subject (novice, expert)? • What is their current level of knowledge? Skill? • What are their attitudes toward the topic? • How many participants will be present? • Do participants believe they have a "need to know"? • Is attendance mandatory or voluntary? • What are the participants' expectations about the topic? The presenter? 	<ul style="list-style-type: none"> • What is the context of this presentation? Is it part of a series of presentations? If so, what will come before and after this presentation? • How might the topic impact their current work activities? • Are there any underlying problems that I might encounter or needs I should address? • What is a typical in-service like for them (ie, what types of teaching strategies are they used to)? • What is the physical environment like? • Will I have access to resources (eg, Internet, handouts, projector)? • Are there any possibilities for follow-up?
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Adapted from Garmston R.J., Wellman B.M. *How to Make Presentations That Teach and Transform*, Alexandria, VA: Association for Supervision and Curriculum Development; 1992; Silberman M, Auerbach C. *Active Training: A Handbook of Techniques, Designs, Case Examples, and Tips*. 3rd ed. San Francisco, CA: John Wiley & Sons; 2006.

Table 4-3. Sample Needs Assessment Strategies

Needs Assessment Strategies	Description	Sample Application in Physical Therapy and Health Care Practice
Observation and experience	Spend time talking with and observing representative people within the organization, preferably engaged in tasks related to your topic	Observe several therapists engaged in performing specific special tests to determine current practice and potential learning needs
Written surveys and questionnaires	Use paper or electronic questionnaires ahead of time to assess reactions, knowledge, attitudes, perceptions, experiences, etc, related to the topic	Develop and disseminate a survey of questions related to your topic and its relevance to the participants
Interview key consultants	In-person or telephone contact with a select number of individuals who know the group you will be working with and can provide essential information relevant to your topic or presentation	Interview program directors, clinical instructors, senior staff, and junior staff to determine the varying levels of expertise and exposure to your topic
Focus group sessions	In a group of 4 to 8 people who are representative of the larger audience, discuss relevant topics to learn more about underlying ideas and issues and to obtain their perspectives on how to design the training for the group	Gather a diverse group of therapists, aides, nurses, physicians, students, etc (individuals who may attend your presentation) and discuss your topic and their perceptions of its relevance to each of the participants. Explore the diverse learning stages of your potential audience
Print materials	Use information (eg, from annual reports, print media, newsletters) to determine the larger context in which presentation will occur	Review recent journals, continuing education advertisements, newsletters, job ads, etc, to determine potential topics for discussion or presentation
Job or task analysis	Using the learner-centered objective established for your presentation, select a number of work activities and analyze them in terms of how they relate to your goals	Complete a task analysis of how patients are scheduled for therapy to determine areas in which educational enhancement or process improvement is needed
Records, reports, work samples	Analyze relevant work samples to determine current levels of expertise and needs for training	Analyze completed documentation to determine potential areas in need of educational enhancement or process improvement
Performance test/tasks	Use standardized measures to assess the knowledge and skills of learners that relate to the topic	Have all members of a given team or staff complete a learning styles inventory to address strategies to enhance team performance

Adapted from Wlodkowski R.J. *Enhancing Adult Motivation to Learn*. Revised ed. San Francisco, CA: Jossey-Bass; 1999; Silberman M, Auerbach C. *Active Training: A Handbook of Techniques, Designs, Case Examples, and Tips*. 3rd ed. San Francisco, CA: John Wiley & Sons; 2006.

Critical Thinking Clinical Scenario

You have a world-renowned expert in women's health coming to a nearby major metropolitan area in May. She would like to offer a continuing education conference on a topic of your choice and wants your clinic to sponsor it. Her fee for the 2 days is \$5000 plus hotel, travel, and accommodations. You are personally very excited because that is your area of practice, but how do you decide whether to move forward or not?

Reflective Questions

In completing a needs assessment to determine the feasibility of sponsoring a continuing education conference:

1. What would you need to know?
2. Who would you assess?
3. How would you assess them?

Although needs assessments provide the most useful information when completed ahead of time, this is not always feasible. You can do a needs assessment at the start of your presentation by using judicious questions. Completing a needs assessment ahead of time will give you a general sense of who will be in your audience; completing an on-the-spot needs assessment will give you a better sense of your specific audience. For example, if you are doing a presentation on how to teach skin self-examination to prevent skin breakdown in the diabetic patient, asking your audience, "Who has worked with patients who have had diabetes and diabetic ulcers?" will give you some indication of the audience's experience related to your topic. Garmston¹⁴ provided a framework for the types of questions you might ask at the start of your presentation, including general questions, content-specific questions, theoretical questions, and practical questions. Table 4-4 provides some examples of on-the-spot assessments using this framework in teaching and learning and in health care.

Key Points to Remember

- The more you know about the learners you teach, the better you can tailor your instruction to meet their needs.
- Techniques for conducting needs assessment prior to a presentation include the following:
 - Face-to-face interviews and discussion strategies
 - Paper-and-pencil questionnaires
 - A review of printed material such as case records (de-identified), annual reports, and professional literature
- On-the-spot needs assessment in the form of questions posed at the beginning and throughout a presentation can yield valuable information.
- In assessing the needs of your audience, it is helpful to ask:
 - General questions
 - Content-specific questions
 - Theoretical questions
 - Practical questions

Developing Learner-Centered Behavioral Objectives

Stop and Reflect

You are doing a presentation to physical therapy students on developing patient education materials.

- What do you want your learner to know as a result of your presentation?
- What do you want your learner to be able to do as a result of participating in the presentation?
- How will you determine that your presentation has been effective?

Table 4-4. On-the-Spot Assessment Strategies

On-the-Spot Assessment Types	Sample Application in Teaching and Learning	Sample Application in Physical Therapy and Health Care Practice
General questions	How many of you have had formal training in giving presentations? For how many of you is this content totally new?	How many of you gather evidence on your patients more than once per month? Once per week?
Content-specific questions	How many of you have done needs assessments before? Used motivational hooks? Used formative assessment?	What databases do you most often use for your searches?
Theoretical questions	How many of you agree that active learning strategies increase retention?	How many of you agree that the only evidence that is important enough to consider in patient care comes from randomized controlled trials?
Practical questions	What is the one thing you would really like to learn today?	How many of you have access to the Internet routinely?

Adapted from Garmston R. *The Presenter's Fieldbook: A Practical Guide*. Norwood, MA: Christopher-Gordon; 1997.

When planning any instructional activity, whether it is a verbal presentation or written materials, it is important to think about the outcomes you want your learners to produce before you actually begin designing the presentation. Steven Covey,¹⁵ in *The 7 Habits of Highly Effective People*, discusses the concept of “beginning with the end in mind” whenever you are planning a course of action (p. 98). If teaching someone is the course of action you are planning, you need to think about the end result, the actual outcome the learner is expected to produce. Well-written objectives define the end result of your instruction and provide you with a “road map” to follow throughout both the design and delivery of your presentation.

Key Point to Remember

BEGIN WITH THE END IN MIND!—Steven Covey¹⁵

In the situation presented at the beginning of this section, you were asked to think about what you might want your learners to be able to do as a result of participating in your presentation on developing patient education materials. If you want your learners to physically create effective patient education materials rather than merely describe what must be considered in developing patient education materials, this outcome needs to be specified ahead of time because this will drive not only the design of the instruction but the expected outcomes of the learner. Developing learning objectives will help you determine the content of your presentation as well as the methods you will use in teaching the content. At the end of your presentation, the learning objectives will also help you determine whether the learner has grasped the critical information and as a result will give you feedback about how effective you were as an instructor. Learning objectives, often referred to as *behavioral objectives*, are specific statements of what you expect your learner to achieve as a result of the presentation.

Key Points to Remember

Well-written learning objectives will help you:

- Define your content
- Determine the teaching methods you will use
- Assess your learners' performance (ie, did your learners learn what you expected them to learn?)
- Assess your effectiveness as an instructor

Benjamin Bloom¹⁶ described 3 distinct domains of learning:

1. The *cognitive domain* refers to the development of knowledge, language-based information, and concepts to be learned. For example, student physical therapists are expected to identify the origins and insertions of various muscles as well as design-appropriate home exercise programs to strengthen certain muscle groups.
2. The *psychomotor domain* refers to the development of motor skills to be mastered. For example, student physical therapists must learn how to transfer patients from a bed to a wheelchair as well as adapt interventions for bedside treatment.
3. The *affective domain* refers to the development of attitudes, feelings, beliefs, and values, which can range from the more simple level of recognizing the importance of something to the more complex level of actually integrating and adopting behaviors that reflect the value. For example, a patient might say, “I know I need to do my exercises more often,” demonstrating that he recognizes the value or importance of doing the home exercise program. On the other hand, if your patient says “I am doing my exercises routinely because I know they are important,” you know that he has adopted this value personally.

Key Points to Remember

The 3 domains of learning described by Benjamin Bloom¹⁶ are:

- Cognitive: Knowledge
- Psychomotor: Skill
- Affective: Attitudes, beliefs, and values

Critical Thinking Clinical Scenario

The following are examples of learning objectives that might be found in a doctor of physical therapy curriculum:

- After this laboratory session, the student will correctly list 5 contraindications to using ultrasound as an intervention.
- By the end of this clinical internship, the student will integrate the core value of professionalism into his or her daily interactions.
- At the end of this course, the student will safely transfer patients from the bed to a wheelchair.

Reflective Questions

1. Which domain of learning does each objective reflect?
2. How might you change each of these objectives to address a different domain of learning?

Each domain of learning is distinct and should be considered in developing learning objectives. In defining the domains, as can be noted by the examples above, Bloom¹⁶ also developed a taxonomy or hierarchical system of classifying objectives from simple (ie, recall) to more complex (ie, evaluation). Table 4-5 illustrates the taxonomic levels of learning in the 3 domains of learning. Bloom¹⁶ and later Krathwohl et al¹⁷ and Simpson¹⁸ provided sample verbs for each level to enable instructors to write objectives that effectively target each level along the hierarchy. As you move up the hierarchy in creating objectives, you increase the level of complexity and challenge of each objective.

The objectives you establish for any given presentation must meet the needs of the learners. As discussed earlier in this chapter, the level of expertise and learning expectations of your audience will vary from a basic level of exposure to a topic, to a higher level expectation of content mastery and integration of information and skills into one's current practice. If your expectations (ie, learning objectives) do not match those of your audience, both you and your audience will be disappointed. In a classroom, establishing expectations up front by using explicit and detailed learning objectives will help your learners know what your expectations are and will enable them to be better prepared to meet your expectations. Students often ask, "What will be on the test?" Having explicit learning objectives should help to minimize the need for this question.

What follows is a more detailed description of the taxonomies within each of the 3 domains of learning defined by Bloom¹⁶ along with some sample verbs for each level in the taxonomies, which may help you in developing appropriate learning objectives.

Cognitive Domain

If you take a look at your course syllabi, you may see that many of the objectives relate closely to the cognitive domain. The cognitive domain is typically the one domain with which instructors and learners are most familiar. However, just recognizing the domain of

learning is insufficient in developing effective objectives. For example, at the end of the unit of instruction, you might want students to explain the various tests and measures that can be used in assessing dysfunction of the knee, or you might want them to develop a decision-making algorithm that will help them decide when to use the various tests and measures presented. These goals are both within the cognitive domain of learning; however, they are at very different levels within that domain. The first objective is at the lower end of the cognitive hierarchy (ie, comprehension), whereas the second is at the higher end of the cognitive hierarchy (ie, synthesis).

The cognitive domain includes 6 levels within the hierarchy. The lowest level is knowledge; as complexity and challenge increase, the cognitive processes move through comprehension, application, analysis, synthesis, and evaluation. Table 4-6 provides descriptions of each level of the hierarchy in the cognitive domain along with sample verbs commonly used in developing objectives that target each specific level, as well as a sample objective for each level of the taxonomy.¹⁶

Critical Thinking Clinical Scenario

You have recently planned several mini-lectures and have developed several objectives including the following:

- Define *andragogy*.
- Compare action learning to other methods of problem solving.
- Provide an example of how you might use action learning in the classroom.
- Define the elements of reflection.

Reflective Questions

1. Where along the taxonomy of the cognitive domain would you place each one of these objectives?
2. How might you change each one of these objectives to increase the level of expectation and challenge?

Table 4-5. Taxonomies of Educational Objectives

Cognitive Domain ¹⁶	Affective Domain ¹⁷	Psychomotor Domain ¹⁸
Knowledge	Receiving (attending)	Perception
Comprehension	Responding (complying)	Set
Application	Valuing (accepting)	Guided response
Analysis	Organization (integrating)	Mechanism
Synthesis	Characterization (internalizing)	Complex overt response
Evaluation		Adapt
		Origination

Table 4-6 The Cognitive Domain

Level	Description	Sample Verbs	Sample Objective
Knowledge	The learner is expected to observe and recall information like events, dates, places. The capability of doing this implies mastery of basic subject matter	List, label, define, name, describe	After reading the section on behavioral objectives, the student will list the components of a well-written objective
Comprehension	The learner is expected to reproduce or communicate knowledge about the topic in his or her own words without verbatim repetition	Summarize, interpret, estimate, discuss	After discussing the chapter on systematic effective instruction in pairs, the student will summarize the key factors to consider in preparing a presentation
Application	The learner is expected to use information, methods, concepts, and theories in new situations to solve problems	Apply, demonstrate, show, solve, distinguish	After reviewing the chapter on the principles of teaching movement, the student will apply the principles of motor control in designing a treatment plan for a 10-year-old child with spastic diplegia
Analysis	The learner is expected to identify components in the material presented, organize the different components presented, and see patterns in the material	Analyze, order, arrange, connect, classify, separate	After the presentation on developing behavioral objectives, the learner will analyze objectives to determine what domain of learning is being targeted
Synthesis	The learner is expected to use old ideas to create new ones; generalize from given facts and draw conclusions	Combine, integrate, create, design, invent, compose, formulate	After completing the unit on technology in teaching and learning, the learner will develop a patient education module using technology appropriately
Evaluation	The learner is expected to compare and discriminate between ideas, assess value of theories, make choices based on reasoned argument, and verify value of evidence	Assess, decide, rank, grade, recommend, measure	After completing the unit on patient education, the learner will evaluate patient education materials on-site to determine whether they are written at the appropriate literacy level

Adapted from Bloom BS, ed. *Taxonomy of Educational Objectives: Book 1 Cognitive Domain*. New York, NY: Longman; 1956.

Psychomotor Domain

The psychomotor domain refers to skills that require some degree of movement or manipulation. Bloom¹⁶ and Krathwohl¹⁷ never created a hierarchy with sub-categories for the psychomotor domain as they had for the cognitive or affective domain. However, others such as Simpson,¹⁸ Dave,¹⁹ and Harrow²⁰ did create hierarchies to address these behaviors. Simpson¹⁸ described a hierarchy that moved from perception (the learner can use sensory cues to help guide his or her movements) to adaptation (the learner has mastered the activity and can adapt it to meet the needs of the situation). Dave's¹⁹ taxonomy, on the other hand moved from imitation to naturalization (the learner's ability to perform the activity without needing to think about it), and Harrow²⁰ moved from involuntary reactions to skilled movements. Table 4-7 provides descriptions of the levels of the taxonomy as described by Simpson¹⁸ along with sample verbs and objectives.

Critical Thinking Clinical Scenario

You are developing a presentation on the use of manipulation in managing cervical pain. Your audience is a class of second-year doctor of physical therapy students who are being exposed to manipulation for the first time.

Reflective Questions

1. Write at least 1 goal for your presentation that addresses the psychomotor domain of learning and one goal for the cognitive domain of learning.
2. How would you modify these objectives if your audience was a group of clinicians who have recently begun to use manipulation in the clinical setting and would like to enhance their current level of competence and decision making related to using manipulation?

Table 4-7. The Psychomotor Domain

Level	Description	Sample Verbs	Sample Objective
Perception	The learner has the ability to use sensory cues to help guide his or her movements	Chooses, detects, distinguishes, identifies, isolates, and relates	The learner will distinguish between appropriate and inappropriate interpersonal skills in working with patients from different cultures
Set	Learners at this stage are prepared mentally, physically, and emotionally to take action (Note: This level of the hierarchy is closely linked to the affective domain)	Begins, displays, explains, moves, proceeds, reacts, and shows	The learner can react appropriately in an unsafe situation
Guided response	At this stage, the learner can imitate complex skills	Copies, traces, follows, reacts, reproduces, and responds	The learner will reproduce the steps of preparing for an ultrasound treatment
Mechanism	The learner is expected to perform a complex skill with a degree of confidence and proficiency	Manipulates, performs, measures, and organizes	The learner will demonstrate proficiency in performing all proprioceptive neuromuscular facilitation patterns
Complex overt response	The learner can perform the complex skill with proficiency, accuracy, and speed, with some degree of automaticity	(Note: The key words are the same as the mechanism level, but performance is quicker, better, more accurate, etc)	The learner will accurately perform a complete review of systems within 15 minutes
Adaptation	The learner at this stage has developed proficiency in performing a skill and can now begin to make adaptations to meet the needs of the situation	Adapts, alters, changes, rearranges, reorganizes, revises, and varies	The learner will modify stair climbing activities when faced with a staircase without handrails
Origination	The learner at this stage can develop new and creative movement patterns to meet the demands of a unique situation	Combines, composes, constructs, creates, designs, initiates, and originates	The learner will create a new training program to meet the needs of a patient with a recent below elbow amputation, who would like to return to caring for her newborn infant

Adapted from Simpson EJ. *The Classification of Educational Objectives in the Psychomotor Domain*. Washington, DC: Gryphon House; 1972.

Affective Domain

In 1964, David Krathwohl and Bertram Masia worked with Benjamin Bloom¹⁷ to develop taxonomy of educational objectives for the affective domain. Objectives in the affective domain focus on the learner's level of acceptance of values, beliefs, and attitudes. As with the cognitive and psychomotor domains, the affective domain was developed in a hierarchical manner from simple recognition, attention, and compliance to a situation or phenomenon to internalization of certain values and characteristics. With the affective domain, however, additional transitions occur as you move up the hierarchy of complexity. As complexity increases, there is a transition from concrete to abstract, from an external to an internal locus of control, and from conscious to unconscious internalization of values. Table 4-8 provides descriptions of the levels of the taxonomy along with sample verbs and objectives.¹⁷

For example, consider the concept of "people-first language." As a new health care professional student,

you may be told by faculty that it is very important for you refer to your patients by their names, not their disabilities. It is not, "my knee patient"; rather, it is "Mr. K, my patient who has a knee problem." You recognize the difference (*receiving*) and work hard to correct yourself when referring to patients because you know that is what is expected (*responding*). As you move up the hierarchy, you begin to realize that it is no longer simply an exercise in doing what is expected of you; rather, you begin to recognize how degrading it can be to be referred to as a disability rather than who you are. You now consistently use people-first language and actually begin to correct those around you when they do not (*valuing*). As you progress in your professional development, you not only value the need for using people-first language but you begin to recognize and value the need to place your patient at the center of your care and to view your patient first as a person with needs and second as an impairment that needs correcting (*organizing*). Finally, as your worldview of your patient, your role in the therapeutic relationship,

Table 4-8. The Affective Domain

Level	Description	Sample Verbs	Sample Objective
Receiving (attending)	Learners are expected to recognize that a given situation or phenomenon exists; they will be consciously aware of and can attend to the situation.	Asks, chooses, follows, gives, holds, and identifies	Having completed a unit on different cultures, the student will identify the cultural differences that individuals from the 2 different cultures might display.
Responding (complying)	Learners are expected to move beyond recognition and attention to actively responding to a given phenomenon. They demonstrate a willingness and motivation to respond to and comply with a given situation or phenomenon.	Answers, assists, aids, complies, conforms, greets, helps, performs, discusses, and practices	The learner will select appropriate home exercise activities that demonstrate recognition of the influence of his or her patient's cultural beliefs when designing a plan of care.
Valuing (accepting)	Learners at this level routinely demonstrate overt behaviors consistent with the given phenomenon, such that they are perceived as valuing the given phenomenon (ie, the phenomenon has personal worth to the individual). Value can range from simple acceptance to a strong commitment.	Differentiates, explains, initiates, proposes, and selects	The learner will consistently select culturally appropriate behaviors in working with patients from different cultures.
Organization (integrating)	Learners at this level begin to organize a variety of values into an ordered relationship with one another and synthesize them into a higher-order value complex; can compare values and resolve conflicts between them.	Defends, formulates, modifies, integrates, generalizes, organizes, and synthesizes	The learner will justify the need for culturally sensitive care.
Characterization (internalizing)	The learner has internalized the given phenomenon to the degree that it is an unconscious component of his or her personal philosophy or worldview; demonstrates a predictable and characteristic pattern of behaviors.	Discriminates, displays, influences, qualifies, serves, questions, revises, solves, and verifies	The learner will exemplify cultural competence in working with individuals from all cultures without hesitance.

Adapted from Krathwohl DR, Bloom BS, Masia BB. *Taxonomy of Educational Objectives: Book 2 Affective Domain*. New York, NY: Longman; 1964.

and your role as a professional expand, you begin to internalize the core values of the profession, making people-first language a part of all that you do as a health care provider (*characterizing*).

Critical Thinking Clinical Scenario

You are working with a third-year student on her final rotation in the clinical setting. You noticed that she often arrives to clinic barely 5 minutes before your patients arrive and frequently leaves the clinic before her notes are completed.

Reflective Question

- To help clarify the expectations you have of your student, write 2 successive goals related to your student's level of accountability. Write your first goal at the level of receiving and your second goal at the level of valuing on the affective domain taxonomy. Indicate when you would expect your student to achieve each of these goals (eg, immediately, within 1 week, by the end of the internship).

These frameworks for developing educational objectives have been in use since their inception with little revision until recently. In 2001, Anderson and Krathwohl²¹ revised the framework for the cognitive domain in recognition of the complexity of the thinking process as we now know it. The revision proposed by Anderson and Krathwohl includes 2 dimensions. The first, the cognitive process dimension, similar to Bloom's original taxonomy, has 6 levels (remember, understand, apply, analyze, evaluate, and create). The second dimension is the knowledge dimension, which has 4 categories (factual, conceptual, procedural, and metacognitive). These 2 dimensions create a matrix that can be used to develop objectives across both the cognitive process and knowledge dimensions.

Dettmer²² also proposed significant modifications to Bloom's taxonomy. She advocates for a framework that is much broader in scope, encompassing 4 domains of learning: cognitive, affective, sensorimotor, and social. She also argues for a unification of these 4 domains,

noting that to be a successful learner requires activity in all domains. She describes phases of learning characterized by *realism* (what learners should know), *pragmatism* (what learners can do), and *idealism* (to what learners aspire). Dettmer²² also suggests that there are 8 phases of learning incorporating all domains that move from basic learning to applied learning and finally to ideational learning. There is much that we still do not know and much left to study. Dettmer²² notes:

Educators should never regard frameworks for educational taxonomies as finished and perfect. Research and development must be ongoing and the resulting information shared widely. Much remains to be studied, rethought, created, revised and studied again as teachers teach and learn and students learn and do.

Though our understanding of the complexity of how we learn has grown significantly and some have advocated for change, Bloom's taxonomy remains the most widely recognized and used taxonomy for educational objectives. It is in part because of its widespread use, simplicity, and ease of implementation that we have decided to focus on Bloom's taxonomy in this text, rather than some of the more recent complex iterations. We do encourage those of you who might be interested to use the references provided as a springboard for additional studies about various educational taxonomies.

Finally, before we leave this discussion, it should be noted that though we write objectives specific to each of the 3 distinct domains of learning, as Dettmer²² suggested, mastery may require some component of the other 2 domains. For example, I could write the following objective: "The student will respond effectively to emergency situations in the clinical setting." The primary focus of this goal is that the student will recognize and respond, which lie in the affective domain. To recognize and respond appropriately, however, assumes that the student already has knowledge of what constitutes an emergency (cognitive domain) and the skills needed to manage the emergency situation (psychomotor domain). In writing goals, it is important to recognize what prerequisite knowledge, skills, and behaviors the student might need in order to successfully achieve the stated goal.

Critical Thinking Clinical Scenario

As a clinical instructor, you are working with a student who is having significant difficulty demonstrating effective interpersonal skills. When interacting with patients, she continually interrupts when they are speaking. Even after asking a question, she does not listen or respond to what the patient is saying. You decide to write some goals to make your expectations more explicit for your student.

Reflective Question

1. Create 1 objective in each of the cognitive, affective, and psychomotor domains that would address this issue.

Stop, Do, and Reflect

Take a look at some of your course syllabi.

1. Can you identify the learning domain for each objective?
2. Can you determine which level of the taxonomy the objective targets?
3. Is each learning domain represented by at least 1 objective on the syllabus? If not, which one is missing? Can you write an objective that addresses that domain?
4. Can you rewrite some of the objectives to reflect a higher level of challenge?
5. Can you develop test questions the instructor could use to assess whether you learned what was expected for each objective?

Using the analogy of objectives serving as a road map to help you stay on course during your presentation, you will want as detailed a map as possible. In developing a presentation, it is easy to go on tangents and add interesting but unnecessary information. Having specific objectives will help you stay focused and on task.

Besides identifying the domain of learning and at what level of the taxonomy you expect your learner to perform, a number of other factors need to be considered in developing a well-written objective. For example, "The student will use active listening skills including rephrasing responses to facilitate effective communication in working with patients." How will you determine whether or not the learner has met the objective? Must the learner demonstrate the desired behavior 100% of the time to be considered adequate? Would you consider 80% of the time acceptable for a novice with the final goal being 100% once he or she has practiced enough? In all teaching-learning situations, in the clinic or the classroom, you will want to consider questions like these when formulating your objectives. The answers to questions like these will help you develop effectively written objectives.

Well-written objectives should specify not only what behavior you expect your learners to accomplish but under what conditions or in what context as well as the degree of mastery you expect. So, a more effective objective than the one above might be, "By the end of this internship, the student will use active listening skills including rephrasing responses to facilitate effective communication in working with patients 90% of the time." A mnemonic device you can use to help you remember some of the components of a well-written objective is "ABCD"²³:

- **A**udience; the "Who"
- **B**ehavior; the "What"
- **C**ondition; the "When/How"
- **D**egree of mastery; the "How well/How much"

The following is an example of a behavioral objective written using the ABCD framework: "Following a lecture, the student will describe the physics of an ultrasound machine accurately."

- A = The student
- B = Will describe the physics of an ultrasound machine
- C = Following a lecture
- D = Accurately

A number of pitfalls to writing objectives should be considered. For example, instructors sometimes write objectives that describe their plans for the session; that is, they focus on their own behavior rather than on what they expect their learner to achieve by the end of the session (presenter-centered objectives). Objectives should always be learner centered; that is, what you want your learner to achieve. The following are examples of incorrectly and correctly written learner-centered objectives:

- Incorrect: This lecture will review the anatomy of the shoulder.
- Correct: At the conclusion of this session, the student will accurately identify the anatomy of the shoulder.
- Incorrect: The student will be shown how to correctly perform a review of systems.
- Correct: Following a demonstration, the student will correctly perform a review of systems.

Because objectives provide a roadmap for both *teachers* and *learners*, some instructors find it helpful to create objectives for themselves as well as for the learner. These objectives describe what the instructor will do to ensure that the learner achieves the stated outcome objective. Sometimes, working backwards can help. Create the learner-centered objectives, and then decide what you as instructor will do to enable your learners to achieve those objectives. For example, if your learner-centered objective is "The learner will apply the concepts of reflection to practice using questions," your objectives as the instructor might include (1) the instructor will present the elements of reflection, (2) the instructor will

provide a narrative for students to practice identifying the elements of reflection, (3) the instructor will demonstrate the use of appropriate reflective questions, and (4) the instructor will design a clinical role play in which students practice using reflective questions. It is important to distinguish between those objectives that guide the instructor's presentation and those that describe the learner outcomes. Table 4-9 provides examples of presenter-centered versus learner-centered objectives.

Critical Thinking Clinical Scenario

You are working with a student in the clinic on developing an educational presentation for the aides in the clinic on how to transfer a patient from the bed to a wheelchair using proper body mechanics. You have 1 hour to teach her about writing objectives. Your goal is to have your student create the learning objectives for the presentation.

Reflective Questions

1. Write at least 2 learner-centered objectives for your session with your student (ie, what are your expected outcomes for the student?).
2. Write 2 learner-centered objectives you might expect your student to develop for the presentation (ie, what are your student's expected outcome for the aides?).

The focus of effective behavioral objectives is the learner and what behaviors or outcomes you expect from your learner, whether the learner is a student, a patient, an aide, or some other health care provider. An example of an appropriately written behavioral objective for a patient might be, "Following instruction by the physical therapist, the patient will accurately demonstrate the prescribed home exercise program."

A well-written behavioral objective also focuses on the *outcome rather than process*. We cannot directly observe or measure a process. We need to specify the outcome of a process to determine whether the process has occurred. The following is an example of an incorrectly and correctly written objective:

Table 4-9. Presenter-Centered Versus Learner-Centered Objectives

Presenter-Centered Objectives (ie, What Will the Presenter Do?)	Learner-Centered Objectives (ie, What Is the Learner Expected to Achieve?)
During this workshop, the presenter will: <ul style="list-style-type: none"> • Describe the theoretical perspectives of various reflective theorists. • Present a framework for the development of questions based on the works of Mezirow, Schön, and Bloom that can be used to facilitate reflective thinking. • Provide scenarios for students to practice developing questions through role-plays. 	By the end of this workshop, the learners will: <ul style="list-style-type: none"> • Differentiate between some of the major theorists in reflective practice. • Formulate a variety of questions using the frameworks of Mezirow, Schön, and Bloom. • Ask appropriate questions that facilitate reflective thinking on-the-spot in a role-play situation.

- Incorrect: The student will research iontophoresis.
- Correct: The student will provide a written synthesis of 5 articles on iontophoresis.

We have also observed instructors to write objectives that state the topic for discussion rather than describing what the learner is expected to do as a result of the instruction on the topic (*outcome versus topic*). For example, a clinical instructor might say to a student physical therapist, "Today we'll focus on the biomechanics of the shoulder." We do not know what the clinical instructor expects the student to do at the end of the day. A more effective objective would be, "At the end of today, you will be prepared to discuss the biomechanics of the shoulder with the other physical therapy intern."

Another common mistake in developing objectives is to include more than 1 outcome in an objective. For example, the clinical instructor might tell the student to list and demonstrate the steps necessary to prepare a patient for massage. What if the student can list the steps but cannot demonstrate the steps? Was this objective achieved? It would be better to use one outcome; in this example, you might select the more complex of the 2 behaviors as an outcome or you might split this into 2 objectives: (1) the student will list the steps she will take to prepare a patient for a massage and (2) the student will properly prepare the patient for massage. Note also that the instructor will be assessing 2 different domains of learning with these objectives. The first objective is written to assess the student's cognitive skills, whereas the second is written to assess her psychomotor skills.

Finally, the more *specific, objective, measureable, and observable* the objective, the more effective it will be in making the expectations explicit and in determining

whether the student achieved the expected outcome. For example, a common goal of clinical education is the development of professionalism in students. Without clear descriptions of desired behaviors, the clinical instructor and students can become frustrated. Your objective for your student might be to interact appropriately with family members and caregivers. What does *appropriately* mean? Is your definition of *appropriately* the same as the student's definition of *appropriately*? Or perhaps you have a student who "lacks initiative" or "lacks professionalism." Again, you may have very specific definitions for these terms that may or may not be congruent with your student's definition. By making your objectives specific, objective, measurable, and observable, you will minimize confusion about your expectations and optimize your learner's ability to achieve the desired outcomes. The following are some examples of incorrectly and correctly written objectives related to professionalism:

- Incorrect: The student will use her free time productively.
- Correct: The student will use her free time to collect evidence to support her selected patient interventions.
- Incorrect: The student will demonstrate the core value of accountability.
- Correct: The student will demonstrate the core value of accountability by ensuring that all written documentation is completed before she leaves for the day.

Table 4-10 provides some questions you might ask yourself when writing objectives to ensure that they contain all the information needed in a well-written learner-centered objective.

Table 4-10. Additional Dos and Don'ts to Consider in Writing Learner-Centered Objectives

Dos (Well-Written Objectives)	Don'ts (Common Errors in Writing Objectives)
<p>Does your objective describe:</p> <ul style="list-style-type: none"> • A behavior you expect the learner to achieve? • A behavior that is specific and not vague? • A behavior that is both measureable and objective? • A behavior that is easily observable? • A single behavior? • The degree to which you expect the learner to master the behavior? • The conditions or context under which you expect the learner to achieve the stated behavior? • An expected outcome, not a topic or learning process? 	<p>Does your objective contain:</p> <ul style="list-style-type: none"> • What you plan to do as a presenter? • What material you will present? • How you plan to present the material? • How you expect the student to learn the content? • Global or vague outcomes? • Multiple outcomes in one objective? • A behavior that is not measureable? • A behavior that is not observable?

Key Points to Remember

Effective behavioral objectives:

- Provide a road map for the instructor and the learner.
- Help define the content of your presentation.
- Help you determine what teaching strategies you will use.
- Help in the assessment of the learner.
- Help guide and assess the efficacy of the instructor.

Effective behavioral objectives include the following:

- A—Audience (who?)
- B—Behavior (what?)
- C—Condition (when?)
- D—Degree (how much?)

Effective behavioral objectives:

- Are learner-centered
- Are specific
- Are behavioral, measurable, objective, and outcome oriented
- Include only 1 outcome per objective

Developing Objectives for a Lecture Versus a Course or Curriculum

The focus of this chapter is on single presentations such as delivering a guest lecture in a doctor of physical therapy program, speaking to a community group, or teaching specific content to a patient. If your presentation is a component of a larger curriculum, it is important for you to understand how your presentation fits within the whole curriculum. You will want to ask many more questions before developing your content, such as how does your presentation relate to the goals and objectives of the course, curriculum, and program? What is the mission of the program? What are the terminal objectives or expected outcomes of the program? Where does your content fit within the overall sequence of courses? What content precedes your lecture, and what comes after? What is the philosophy of the program faculty? What teaching and assessment methods do other faculty members use? What is the curriculum model?

For example, if the physical therapy program where you will teach is built on a problem-based curriculum model, your objectives would need to include language and activities reflective of this problem-centered approach. If you are teaching in a school that emphasizes service learning as a guiding principle for all of its programs, your objectives may very well need to include behaviors that integrate learning in the community. It is important to remember that there are no isolated lectures within a curriculum; all lectures should be linked to the course, the curriculum, and the overall mission, goals, and objectives of the program. In

addition, how you present your content should also be consistent with the philosophy, mission, and goals of the program and its faculty.

Curriculum development and assessment are beyond the scope of this book. If you are being asked to develop an entire course or curriculum, it would be important for you to obtain additional resources related to curriculum design and development before starting.²⁴ In addition to texts on educational theory and curricular design, in physical therapy, we would strongly recommend that you review professional documents from the American Physical Therapy Association and the Commission on Accreditation of Physical Therapy Education such as *A Normative Model for Physical Therapist Education*,²⁵ the *Normative Model for Physical Therapist Assistant Education*,²⁶ *Evaluative Criteria for Accreditation of Education Programs for the Preparation of Physical Therapists*,²⁷ and *Evaluative Criteria for Accreditation of Education Programs for the Preparation of Physical Therapist Assistants*.²⁸

Content

Finally, you are at the point of considering the specific content of your presentation or other instructional activity. You have considered the audience, conducted a needs assessment, and set appropriate learner-centered behavioral objectives. Now, you are ready to organize the information and/or skills to be conveyed to your learner(s). To the layperson, teaching or presenting content is the same as telling the audience what you want them to learn. Knowing what we do about brain function and memory, we recognize how much more complex teaching is than simply presenting information.

We know that people need periodic opportunities to process whatever information they see and/or hear. Without time to process information and make it personally relevant, learners become passive listeners, not engaged learners. Garmston and Wellman³ emphasized the need to adjust the balance between content and process depending on the goal of your presentation. If the goal is for the audience to integrate and apply the information presented, then the instructor will need to allow a significantly greater proportion of time for processing. If the goal is only to expose the audience to the topic, less time for processing may be necessary. If the goal is for the learner to acquire a certain skill, then the learner will need sufficient time to practice (process) the information being presented. Table 4-11 illustrates different ways you may consider varying the ratio of content and process depending on the goal of your presentation.

Key Point to Remember

Balance content versus process based on your audience and the goals of your presentation.

Table 4-11. Balancing Content and Process in Presentations

If the goal of your presentation is ...	Consider...
Knowledge acquisition	Cycles of content followed by process time should be used throughout the presentation period. Provide a brief presentation of content followed by brief periods of activity to allow the learner to process the material presented, to make connections, and to move what they are learning from short-term to long-term memory. Working in small chunks enhances memory retention. For example: 15-minute mini-lecture, 5-minute activity, 20-minute mini-lecture, 5-minute activity, 15-minute mini-lecture, 10-minute activity, etc
Skill acquisition	As above except the cycles of content are followed by much longer practice periods. For example: 30-minute presentation, 30-minute practice, 15-minute presentation, 30-minute practice, 20-minute presentation 25-minute practice, etc
Attitude development	Begin the cycle with processing time. Have the learner process his or her own attitudes first, and then present material for them to compare and contrast. For example: a 30-minute small and large group discussion of attitudes, followed by a 20-minute presentation of theoretical concepts, end with an activity to compare, contrast, and process content
Application	Begin the cycle with a longer presentation followed by an activity that requires the learner to apply what was presented to practice. For example: 30-minute presentation of theoretical concepts, followed by 45 minutes to apply these concepts to a case scenario

Adapted from Garmston RJ, Wellman BM. *How to Make Presentations That Teach and Transform*. Alexandria, VA: Association for Supervision and Curriculum Development; 1992;

Critical Thinking Clinical Scenario

You are a clinician who is a board-certified sports clinical specialist with advanced training as a biomechanist. You have been invited to do 2 lectures for a nearby doctor of physical therapy program. You will be presenting on the topic of running gait to a class of first-year students and then to a group of post-professional, transitional doctor of physical therapy students. The first-year students have only recently been introduced to gait and gait analysis and want to learn the concept of gait and how gait changes with increasing velocity. The post-professional students all have clinical experience and a keen interest in sports and running injuries.

Reflective Questions

1. How might the goals for these presentations differ?
2. How might the presenter's level of expertise be potentially problematic?
3. Where along the cognitive hierarchy would the goals for the first-year students likely fall? What about for the post-professional students?
4. How might the ratios between content and process differ?
5. If you were in either group, what information about gait would you want?

In thinking about how to sequence the material to allow for the appropriate ratio of content and process time, it is also important to consider how much information to present at a time for optimal learning. Some theorists propose a "rule of 7." This is based on the

idea that working memory has a limited capacity and can only process 7 items or "chunks" of information, plus or minus 2 items at 1 time. Not all theorists agree with the number 7 plus or minus 2. In the literature, this number varies from 2 to 7 chunks of information.²⁹⁻³¹ Regardless of the actual number of discrete items of information that working memory can process, evidence indicates that there are limits. There is no absolute limit, though, because learners differ in terms of the amount of new information each can group or chunk together into a single unit. The more a learner knows about a topic already, and the more experience the learner has related to the topic, the easier it will be for that learner to group larger amounts of information into a single chunk of information. Squire and Kandel³¹ suggested that a major difference between experts and novices is the amount of information contained in each chunk to be processed in working memory.

Consider organizing your content in terms of what Garmston¹⁴ described as "containers." These containers help the learner chunk the material, making it easier to remember and retain. Examples of how you might create these containers include saying, "There are 3 key theories," and then cite them or tell the audience, "There are 2 commonly used approaches to the treatment of a specific impairment," and then compare and contrast them. Speakers also may provide acronyms or use the first letter of the first word of several points to help organize content. We provided an example of this when we used the ABCD framework for developing effective behavioral objectives. By including containers

such as these, the presenter makes it easier for the information to be considered as 2 to 3 meaningful chunks instead of a larger number of discrete points.³² Any time you create a mnemonic device or memory aid to help learners organize the new information and embed these mnemonics in your instruction, you are using containers.³³

Because there are limits in the amount of new information a learner can process, effective instructors use the guiding principle of “less is more.” It is best to limit the amount of new information you provide at any given time and consider ways to organize that information into meaningful chunks. In addition, because learners need to connect new information to prior knowledge about the topic, they will benefit from frequent processing opportunities. A good rule of thumb would be to consider incorporating an activity to process information every 15 to 20 minutes—less frequently for less content-dense information and more frequently for more content-dense information. This concept will be discussed further later in this chapter under “Active Learning Strategies” on page 90.

Key Points to Remember

Some rules of thumb:

- LESS IS MORE!
- “Chunk” information.
- Incorporate frequent activities (ie, every 15 to 20 minutes) to help learners process information, make it personally relevant, and link it to something they already know.

Another rule of thumb to keep in mind is “*Covering material does not equal learning.*” If you listen outside the door of any high school classroom in the weeks before state exams, such as the New York State Regents exams, you may hear comments like, “We have to get through this material before June.” Or you might hear a faculty colleague say, “I can’t include more collaborative learning activities; I have too much material to cover in this course as it is!” If you agree that learning something is different than *covering it*, again, you will want to limit the amount you present and allow sufficient time for active learning, which is an excellent example of processing.

Key Point to Remember

Covering material **does not** equal learning!

There is one last rule of thumb to consider in determining what content to present and how to present it.

When you are invited to present on a topic, it is usually because you are recognized as having expertise in this area. This can be a double-edged sword; knowing a great deal about a topic makes it more challenging to limit how much you can share effectively. It may be helpful to make the distinction: *need to know vs nice to know*. As an expert, you might think everything is important or necessary for the learner to master. Hearing or reading too much information in the early stages of learning can be ineffective for the novice learner. The sign of an effective presenter is deciding what your learners need to know about the topic to achieve the goals you have set and editing out details that may overwhelm the learner and detract from the essential points.

Key Point to Remember

As an expert, you must distinguish between need to know and nice to know.

Stop and Reflect

Consider the scenario about the topic of gait presented earlier in this chapter.

Reflective Questions

1. Which information might be necessary (need to know) for experienced clinicians?
2. Which information might be potentially overwhelming (nice to know) for first-year students?
3. What factors would help you determine the appropriate information for each group?

Motivational Hooks and Content Boosters

Once you have determined the overall organization of the content you plan to teach, whether you are working with colleagues, students, or patients, you need to think about how you will engage their attention and shift their attention away from whatever other stimuli are available to them in the surrounding environment to what you want them to learn. As we learned in Chapter 3, only a small portion of potential stimuli is attended to at any given time. Two factors that increase the likelihood that someone will pay attention to something long enough for it to enter working memory are personal meaning and emotion. We consider any technique you use to capture your learner’s attention to be a *motivational hook*, a term developed by Dr. Nancy

Table 4-12. Motivational Hooks

<ul style="list-style-type: none"> • A startling or fun fact • A provocative question • An interesting picture • A puzzling song • An anecdote 	<ul style="list-style-type: none"> • A personal question • A relevant video clip • A demonstration • A display of a piece of equipment or a model
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Aronson and Dr. Beverly Arscht, Philadelphia-based educational consultants. Similar to the *antecedent set*, described by Madeline Hunter,² the motivational hook is your “opening line,” your opportunity to engage learners long enough to interest them in what you have to teach. Table 4-12 provides some examples of different types of motivational hooks that you might consider depending on your topic and learning goals.

The most effective motivational hooks focus on the topic, build interest, establish rapport, and energize the environment. The best motivational hooks create an emotional connection with the learner, through humor, novelty, or personal relevance, yet do not overwhelm the topic. For example, a group of student physical therapists conducted a classroom presentation on the use of lasers in physical therapy. They chose to begin their talk with a video clip from the first *Star Wars* movie. Had the clip lasted 10 to 20 seconds, it would have been very effective. Instead, the video selection continued for 2 minutes, long enough for the class to become engrossed in the movie and disappointed when the presentation began. What happened in this incident? The length of the motivational hook was too long, and it overwhelmed the topic. It goes without saying that motivational hooks should always be in good taste. Something that strikes you as funny could be offensive to 1 or more people in your audience.

Key Points to Remember

Motivational hooks are any techniques you use to capture your learners’ attention. Personal meaning and emotion increase the likelihood that someone will pay attention to something long enough for it to enter working memory.

- The most effective motivational hooks:
 - Focus on the topic
 - Build interest
 - Establish rapport
 - Energize the environment
- The best motivational hooks create an emotional connection with the learner through:
 - Humor
 - Novelty
 - Personal relevance
- Motivational hooks must not overwhelm the topic.

Critical Thinking Clinical Scenario

Recall the scenario presented at the beginning of this chapter about giving a presentation on osteoporosis to a group of women in your community.

Reflective Questions

1. What are 2 possible motivational hooks suitable for a presentation to a group of women who are residents in an assisted-living facility?
2. What are possible motivational hooks for a presentation to a group of female high school athletes?
3. If you chose different motivational hooks for each group, what factors guided your decision?

Now that you have captured your learners’ attention, how will you will emphasize the most important points and keep your audience involved? How will you *boost* the content (to use another term coined by Dr. Nancy Aronson and Dr. Beverly Arscht)?³⁴ *Content boosters* refer to any techniques, materials, and activities that you use to reinforce learning and allow for the processing of information.

Stop and Reflect

- What types of content boosters have you seen used in classrooms?
- What types of content boosters have you seen used in the clinic?
- Do you have preferences regarding the types of content boosters you have personally experienced? Are some more effective for you than others?

Depending on the topic and the specific content you wish to emphasize, you have many options for creating effective content boosters. Table 4-13 lists a variety of frequently used content boosters.

Many of the containers discussed earlier in this chapter could be considered content boosters. For example, the ABCD model for writing effective learning objectives boosts the likelihood that you will remember the essential components of written objectives. As with motivational hooks, your choice of content boosters depends

Table 4-13. Sample Content Boosters

<ul style="list-style-type: none"> • Handouts • Artifacts and props • Visual aids (video, PowerPoint, anatomical model, slides, etc) • Flip charts/newsprint • Stories/songs 	<ul style="list-style-type: none"> • Demonstrations • Case studies • Mnemonics • Active learning strategies • Games, quizzes/role plays • Electronic discussion boards/chat rooms
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on the topic at hand and the key points you want to emphasize. The same considerations hold for content boosters as for motivational hooks: Select appropriate materials/activities that are in good taste and do not overshadow the key points you wish to reinforce.

There are many similarities among the materials and/or activities listed under motivational hooks and content boosters. In fact, many are the same. What is the essential difference between the two? In 2 words, *timing* and *purpose*—where you place the activity in your presentation and why you chose to use it—If you use a model of the spine at the beginning of a presentation on low back pain and disability, you are using it as a motivational hook, perhaps by asking the group, “What does this model have to do with the cost of various impairments to society at large?” Ideally, you would elicit discussion about, and interest in, your topic if it were about the impact of low back pain and days lost from work. The purpose of the motivational hook is to grab your audience’s attention. If, instead, you were teaching students about the anatomy of the spine and you passed around the model of the spine to reinforce what you had taught about vertebrae, you would be using the model as a content booster. The purpose of the content booster is to reinforce the content you are teaching.

Motivational hooks and content boosters also allow you to add activities for the various learning preferences represented in your audience. As noted earlier, without actually assessing everyone’s individual learning style, you can assume that there will be “watchers” and “doers” in every group. The watchers prefer to look first, reflect on the task, and then become more active. A motivational hook such as a relevant cartoon or video clip or a startling statistic is perfect for them. Something more active, such as asking your participants to try to go from sitting to standing using only 1 leg, would engage the doers in a presentation about physical therapy with people who have had a leg amputated. Once you have chosen your motivational hook, whether it appeals more to watchers or doers, you can select a content booster that appeals to the other preference. In the prior example that required people to do something physical right at the beginning of the presentation, the presenter might use a PowerPoint presentation as a content booster that appeals more to watchers.

In addition to watchers and doers, remember that there are also people who prefer theory and facts more

than anecdotes, stories, and other content that appeals to the senses, and vice versa. Effective instructors include a number of content boosters to appeal to these varied preferences. A presentation about physical therapy post-amputation might include statistics about incidence of amputation in the target group and reports about the latest, computer-assisted prostheses, provide anecdotal information based on the presenter’s clinical experience, and include a case example where participants could work in small groups to adapt and apply what they had learned from the lecture. Watchers and doers would be engaged, as would people who prefer theory, facts, stories, and anecdotes. Overall, the presentation would have something for all 4 learning styles and for all the different types of audiences.

Key Points to Remember

The essential differences between the motivational hook and content boosters are timing and purpose:

- Motivational hooks are used at the start of a component of the instruction to gain attention.
- Content boosters are used throughout the instruction to reinforce learning.

In planning your motivational hooks and content boosters, consider your audience:

- Watchers and doers
- Those who prefer concrete examples versus theory and facts

Critical Thinking Clinical Scenario

Select either the topic of osteoporosis or gait and determine a hypothetical audience and goals for the presentation.

Reflective Questions

1. What content boosters might you choose to use for your presentation?
2. Which learning style and audience type would prefer these content boosters?
3. What other content booster could you add to appeal to other learning preferences?
4. What could you do as a motivational hook to balance your content boosters and expand the appeal to other learning preferences and audience types?

Strategies for Enhancing Memory Formation

The formation and retrieval of memories is the basis for learning. The following are some strategies that may enhance your memory formation and retrieval. You might consider using these same types of strategies in your presentations as well as with your patients to help them learn and retain the information you are providing:

- Rehearsal and elaboration
- Creating context and linking information to prior knowledge and past experiences for learning
- Recruiting multiple memory pathways
- Active learning strategies

Rehearsal and Elaboration

How many times have you been introduced to someone and almost immediately forget his or her name? Has anyone suggested any strategies to help you better remember the name of the person to whom you were introduced? Perhaps they suggested that you might say the name immediately (eg, “Oh, it is so nice to meet you Mary”) or maybe try to associate the person’s name with something about the person or someone else you know (eg, Mary has the same color hair as my Aunt Mary who also happened to grow up in the same state as Mary). These are examples of 2 key strategies to enhance our memory formation, rehearsal, and elaboration. Rehearsal and elaboration are 2 key strategies we use to manipulate information while in working memory to increase the likelihood that this information will make its way into long-term memory.³² Repetition is one of the most commonly used types of rehearsal. We literally repeat what it is we need to remember. Any time you needed to remember someone’s phone number long enough to punch in the numbers, you probably used repetition. If you were interrupted in the process, however, you probably could not remember the telephone number.

Repetition is not as effective with semantic memory tasks as it is for skill or procedural memory. Repeating or practicing a motor skill over and over generally results in improved performance and enhanced memory of how to execute the movement. For example, at some point in time, you became unconscious of the steps involved in a task such as riding a bicycle, and you began to go through them automatically. Repetition helped you store these movements in your implicit or procedural memory.

Elaboration, or elaborative rehearsal, is a more effective strategy for manipulating semantic information while in working memory.³² Medina³⁵ and Squire and Kandel³¹ emphasized the importance of focusing on meaning

when trying to learn new semantic information. One example of an elaborative rehearsal strategy is to create a story to remember a list of items. You are more likely to remember the list of items if you create a story that includes all the items you want to remember in a cohesive narrative, rather than simply trying to memorize the list. The story helps to put meaning to the words in the list, even if it is a silly or fun story.

A mnemonic, as noted above, is a form of elaborative rehearsal as well. For example, how do you remember the names of the planets in order? Have you used a story such as “My Very Educated Mother Just Served Us Nine Pickles” to remember Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto? We will not tell you how many years ago we learned this “story” but it remains easily recalled as a result of both repetition and elaboration. This strategy is not used solely in grade school; you likely have used the same strategy to learn material in graduate school. For example, how do you remember the cranial nerves? Does this sound familiar: “On Old Olympus’ Towering Tops a Friendly Viking Crew Vines and Hops”? How do you remember whether each nerve is a sensory nerve, motor nerve, or both (mixed)? Does this 1-line story/mnemonic have meaning for you: “Some Say Marry Money, but My Brother Says Big Brain Says Matter More.”

There are many other familiar activities that provide opportunities for elaboration although we might not have considered them in this framework. Whenever we engage in a group discussion about newly presented material or we “debrief” after practicing a new physical therapy intervention, we have a chance to increase our connections to the new information and increase the likelihood that we will remember it. Reciprocal teaching, whereby learners “partner up” and take turns using their own words to teach one another the key points presented by the instructor, is an excellent activity to foster elaboration. Even in the clinic, the physical therapist can ask the young patient to describe the key components of her home exercise program and can ask her parent how she might work on it at home before leaving the session as a means of facilitating both repetition and elaboration for the purposes of enhanced recall.

Stop and Reflect

Reflect back on some of the methods you have used to help you recall information.

- What types of repetition and elaborative strategies have you used that have been most successful?
- Can you think of how you might incorporate repetition and elaboration into your current study strategies?

Key Points to Remember

Rehearsal and elaboration can enhance memory formation.

- Rehearsal, or repetition, is most effective for nondeclarative or implicit memory formation (including skill and procedural memory).
- Elaboration or elaborative rehearsal is most effective for declarative memory formation.
- Elaborative rehearsal includes strategies such as:
 - Creating stories
 - Creating mnemonics
 - Discussions
 - Debriefing sessions
 - Reciprocal teaching

Creating Context and Linking Information to Prior Knowledge and Past Experiences for Learning

Medina³⁵ discussed several guidelines for strengthening the neuronal connections that result in more effective memory formation and retrieval. First, using relevant examples and activities that involve personal reflection fosters deeper meaning of new information. For example, if you are teaching students how to design an effective in-class presentation, first ask your students to think about the best presentation they have experienced in graduate school (personal reflection). Then ask them to identify the behaviors that made this presentation memorable, share these behaviors with a person sitting nearby, and make a list of the most important behaviors to consider (critical thinking). You then proceed to teach the key points about effective instruction, knowing that your students will connect your instruction to their prior experience by making it personally meaningful. You have essentially “primed the pump.” In doing so, you make it easier for your students to connect the new information to prior knowledge, making it easier to understand and retain.

Another strategy for enhancing memory retention and retrieval builds on the finding that some of the neural connections made at the time you are first exposed to certain information remain in the area of the cortex where it is first processed. If we can provide students with authentic real-world experiences for learning, it is hypothesized that they may be prepared to more readily retrieve the information when faced with similar circumstance in practice. For example, providing students with multiple opportunities to engage with standardized patients to enhance their communication skills as well as their history and physical skills may enhance the likelihood that they will remember this experience when faced with a real patient in the clinical environment. In addition, recruiting the

episodic or more autobiographical process helps. For example, role plays and simulations allow the learner to internalize and act out conceptual information and thus add a personal experience related to the information to be learned.

Is it possible that engaging in these authentic experiences may also elicit implicit memories and explain why a student physical therapist might experience memories of his or her first clinical internship when visiting a hospital years later? The sights, sounds, or odors of the hospital may have triggered a flood of unconscious or implicit memories as he or she entered the hospital again. Field trips to clinical sites, visits to a prosthetist while studying about prosthetics, and volunteering in a facility serving children or elderly people are all multisensory experiences that may enhance learning and retrieval of information related to those places.

Whenever we are actively engaged in learning and applying something new, it is unlikely that we think of neuronal connections forming and becoming stronger. In fact, once we really know something well, it is sometimes difficult to remember how we even learned the information or how the information first connected with something we knew previously. The art of effective instruction lies in helping learners see the relevance of new information to their lives and to what they know already. When new information seems relevant, it is easier to see how connections can be made. In the classroom and the clinic, we can help learners make connections by developing examples based on their experiences and interests. We can ask them questions to prompt reflection about where and how new content might fit into their prior experiences. Throughout this text, we ask you to “Stop and Reflect” so that you have the opportunity to add your own perspective to the content presented. We also provide many clinical examples to make the content as relevant as possible. In the clinic, therapists may incorporate activities of daily living into a home exercise program to make it easier for the patient to learn and perform the new exercises. Whenever and wherever we teach, we want to highlight meaning and encourage learners to connect new information to prior learning.

Key Points to Remember

Creating context and linking information to prior knowledge and past experiences can enhance learning. Examples of how we can create context and link to meaningful experiences include the following:

- Using concrete and relevant examples.
- Fostering reflection through “Stop and Reflect” activities to enable the learner to develop deeper, more personal understanding of the information.
- Using authentic experiences (eg, role plays, field trips, and other simulations such as standardized patients).

Recruiting Multiple Memory Pathways

Because the memory process is distributed throughout the brain, we have the potential to recruit multiple pathways when we teach. In physical therapy and all the health sciences, there is a vast amount of information destined for explicit memory processes. All the theories, rationales for treatment, foundational sciences, and analyses of professional literature depend on semantic or declarative memory, the system thought to be more recently developed and weakest in humans.^{29,32} Lack of sleep, stress, and initial misunderstanding are all factors that can interfere with accurate memory formation. One way to optimize the semantic system is to use multiple methods of presentation and provide several different ways to apply the information. As much as possible, use visual aids to support auditory information during lectures. Pictures, especially moving animations, are more effective than the printed word alone.³⁵ Even adding movement to whatever you are teaching or trying to learn can help recruit procedural memory processes. Something as simple as taking 3 steps while learning the 3 main components of a theory or the 3 components of a particular home exercise program adds a motor element to your learning. Practicing with a partner as though you were actually helping a patient transfer from sit to stand can add both movement and episodic component to preparing for a practical exam.

Recruiting multiple memory pathways is equally important in the clinic setting. For example, as a student physical therapist, when you observe the clinical instructor perform certain interventions with a patient, you begin to make sense of your clinical instructor's actions visually as you activate neuronal connections related to the interventions you learned previously in school. Your ears receive the auditory stimuli created by the dialogue between your clinical instructor and her patient. If the clinical instructor asks you to describe how this intervention is similar to, and different from, other interventions you have used with this patient, the elaborative process is called in, and even more memory pathways are linked. You reactivate prior connections and probably develop new ones as you compare aspects of this observation with past experiences in the classroom and lab situation. Your prior knowledge and memory about this particular intervention will have been strengthened through the multiple types of memory pathways elicited and the elaboration that occurred throughout this encounter.

Providing multimodal input (eg, visual, auditory, kinesthetic) may very well enhance learning and retention more than providing unimodal input (eg, lecture only) alone.

Key Point to Remember

Based on what we now know about brain function and memory formation, in the teaching-learning situation, providing multimodal input (eg, visual, auditory, kinesthetic) will likely enhance learning and retention more than providing unimodal input (eg, lecture only) alone.

Active Learning Strategies

Anyone who has ever watched a baby learn how to eat or manipulate a new toy or try to say the alphabet has observed active learning in its purest form. The baby holds, mouths, drops, grasps, and imitates others as he or she figures out how to do something. When student physical therapists are learning different interventions for various impairments or functional limitations, they too need to watch demonstrations, practice how to position their hands to implement the interventions, and try out these movements on one another in lab sessions before ever working with patients. They are demonstrating one aspect of active learning, the actual doing of something. These hands-on activities are active learning strategies and act as content boosters. Active learning strategies are a particular form of content booster and a critical component of effective instruction.

It would be hard to imagine any other way to teach student physical therapists how to treat patients. On the other hand, it may be more difficult to imagine how to teach a subject like physiology, gerontology, or osteoporosis using active learning strategies. If we consider that active learning also involves actively thinking about, reflecting on, and cognitively interacting with the content being taught, it becomes easier to imagine. Asking learners to think about any associations they have to a topic or requiring them to compare a concept that was learned previously with something being taught currently represents a degree of active learning.

You might ask, "Why should learning be active?" The simplest explanation, based on what we know about how the brain works, is that learning depends on moving information from working memory to long-term memory. The learner needs to do some type of rehearsal or manipulation of the content for this to happen. In other words, the learner needs to actively process information rather than passively receive it. Active learning strategies require the learner to interact with the content rather than simply listen to, or look at, what is being presented. For example, developing a mnemonic or a humorous song about the cranial nerves is 1 way students might actively engage with material that could be considered somewhat "dry." Information about the cranial nerves is more likely to get into, and be retrieved from, long-term memory whenever the student sings that song.

Table 4-14. Retention Rate Based on Instructional Strategies

Instructional Strategies	Retention Rate (%)
Teaching others	90
Practicing by doing	75
Discussion	50
Demonstration	30
Audiovisual presentation	20
Reading	10
Lecture	5

Data from Silberman M, Auerbach C. *Active Training: A Handbook of Techniques, Designs, Case Examples, and Tips*. 3rd ed. San Francisco, CA: John Wiley & Sons; 2006; Sousa D. *How the Brain Learns*. Thousand Oaks, CA: Corwin; 2006.

The benefits of active learning on retention and achievement have been investigated at all grade levels—from elementary school through high school, college, and graduate education in the past 2 decades. These strategies were found to result in better achievement than teacher-centered or lecture presentations.³⁶⁻³⁸ Fink¹ emphasized the importance of active learning when designing effective college courses. He referred to the creation of “significant learning” as the goal of college instructors, and he included reflection as a key component of active versus passive learning. The use of reflection as a strategy to help learners make sense of their learning and link them to past, present, and future experiences was explored in Chapter 2. Combining active learning and reflection have been shown to enhance all types of learning.³⁹⁻⁴³

Consider the scenario that appeared at the beginning of this chapter. Were you thinking about developing a brief lecture about osteoporosis, perhaps supported by PowerPoint slides? If so, look at Table 4-14, which lists the typical retention rate for a variety of instructional strategies.⁶ The percentage of material retained after experiencing the various approaches demonstrates the relative benefits of active approaches such as discussing, practicing, and/or teaching someone else as compared to simply looking or listening. Where would a lecture supported by slides appear? Would you be satisfied with the retention of that percentage of the material you presented?

Silberman and Auerbach^{6,44} provided a compendium of active strategies to enhance learning and retention in their seminal book, *Active Training*. Although this book initially targeted corporate trainers, it contains useful activities for many teaching-learning situations. These activities represent content boosters that will appeal especially to the doers in your audience.

As mentioned previously, active strategies allow for more effective learning to occur. If you want your learners, whether they are patients, students, or colleagues, to

remember what you are teaching, it is important to plan ways for them to periodically process and manipulate the information presented. Active strategies infuse the learning experience with energy. University students, observed during lectures, have shown predictable patterns of behavior that would distress anyone trying to teach effectively. It has been noted that generally within 5 to 10 minutes students begin to “settle in,” getting pens out, etc. After about 20 to 30 minutes, students start fiddling with pens/pencils, looking around, and engaging in tasks other than listening to the speaker. Within 45 to 60 minutes, many students may even begin to exhibit a “trance-like” behavior, and, shortly after that, some students have been noted to fall asleep. This was even observed in medical students, certainly a group of students assumed to be highly motivated.⁴⁵ In addition, today’s students have cell phones and computers to distract them. If you have ever sat in the back of a large computer lab during a lecture, you may not see trance-like behaviors but you will most certainly see students sending and receiving text messages, checking electronic mail, and surfing the Web. With all of these distractions, keeping students actively engaged in the classroom becomes both more challenging and more critical.

The traditional lecture has a number of limitations, and without modifications, it can foster passivity in students and limit independent thought and problem solving.^{1,37,46} Sustained lectures appeal primarily to people with strong auditory preferences and are based on the assumption that everyone in the audience shares this preference. There is also an assumption that when the teacher is talking, the student (patient or colleague as well) is listening to what is being said. You can be the judge of how well this assumption holds up.

Consider this question: During a lecture, have you ever thought about an upcoming event or an argument from the day before? It is common for people to daydream periodically, and these thoughts interfere with attending to what is being taught. But it is also possible to come back to task long enough to get the gist of a presentation. With the goal of teaching as effectively as possible, we want to minimize the frequency of daydreaming and distraction during instruction; we want to minimize the ebb and flow of the learner’s attention. We want to optimize the learning experience by helping working memory process information and move this information to long-term memory. Our goal is to promote retention. Listening to lectures without periodic active processing does not foster retention. We want learners to actively engage with the material being presented. We want them to do the work that it takes to gain and retain new knowledge.

Consider this question as well: Who does all the work in preparing and presenting a lecture? Certainly the instructor! With a lecture, the presenter is doing the work of organizing, synthesizing, and learning the material so that he or she can present it with some degree of credibility and expertise. What we want is for the learners to equally engage with the material so they, too, can learn as much as the instructor!

In spite of what we have learned over the years about active learning and effective instruction, the lecture remains a popular instructional methodology.⁴⁷ In fact, there are times when lectures are an effective mode of instruction. Lectures can be a time-efficient strategy for pulling information from multiple sources to introduce a new topic to learners. The lecture, or *lecturette*, a brief lecture, can spark interest in, and enthusiasm for, further study. Because the instructor can integrate current research from varied sources in a brief lecture, the lecture can supplement information in a textbook that is typically several years old even at the time of publication. Lectures may be less threatening to learners because they are familiar with them and the teacher is doing almost all of the work. For learners who prefer watching and listening, lectures provide a comfortable and effective format.⁴⁶ So, as educators, we do not advocate total elimination of the lecture. Lectures, presented well, can be effective strategies for teaching content. However, punctuating your lecture even for brief periods of time to allow the learner to process information will enhance the efficacy of your presentation and optimize the chances that your learner will retain the information you are presenting. Even taking 60 seconds to ask the learner to write down the key points presented or to share his or her thoughts on the topic with his or her neighbor will engage the learner and facilitate processing of the content.

The length of a presentation may also impact its effectiveness. Sousa³⁰ described the concepts of *primacy* and *recency*, findings from psychological research first reported in the late 1800s by Ebbinghaus.⁴⁸ Briefly, this research demonstrated that people remember best what they hear at the beginning of a learning experience. The second most memorable time in a presentation is at the end. The least favorable spot for information to be remembered is the middle portion of a presentation. Sousa³⁰ used the terms *prime time* and *downtime* to highlight the most effective and least effective parts of a teaching-learning experience. He noted that a larger percentage of downtime occurs during presentations longer than 40 minutes. In the 40-minute lesson, there are 2 prime times of approximately 15 minutes' duration each, leaving 10 minutes of downtime. In an 80-minute lecture, the downtime constitutes about 30 minutes, a much larger percentage of the instructional period. Given the time needed for working memory to process new information, Sousa recommended using several

cycles of 20 minutes of presentation followed by a few minutes of processing time for optimal learning.³⁰ This is what we refer to as the brief lecturette.

Key Points to Remember

Active learning strategies:

- Give learners an opportunity to rehearse or manipulate the content being presented, which will increase the likelihood of retention.
- Include actively thinking about, reflecting on, and cognitively interacting with the content being taught.
- Infuse the learning experience with energy.
- Encourage the learner to do the work of learning.

Benefits to the traditional lecture:

- It enables the instructor to integrate information from multiple sources to introduce a new topic to learners.
- It can spark interest in, and enthusiasm for, further study.
- It is less threatening to learners because they are familiar with them and the teacher is doing almost all of the work.

We do not advocate total elimination of the lecture; however, punctuating your lecture for even brief periods of time to allow the learner to process information will enhance the efficacy of your presentation and optimize the chances that your learner will retain the information you are presenting. Each 20 minutes of presentation should be followed by a few minutes of processing time (ie, active learning) for optimal learning and retention.

Look at Table 4-14 again, this time in terms of active learning. The 3 strategies that result in at least 50% retention all require learners to be active. Each of the strategies can be considered a content booster. If you want your learners to remember what you have taught, ideally, you will include something active as 1 of your content boosters.

Stop and Reflect

- What types of active learning strategies have you been exposed to throughout your education from grade school through graduate school?
- Have some active strategies been more effective for you than others? If so, which ones, and what made them so helpful?
- How does physical therapy school compare to undergraduate courses in terms of the use of active learning strategies?

There are myriad active learning strategies and comprehensive resources available in book form or online.^{30,33} The choice of strategies depends on the content and goals of your instruction. Chances are that you

Table 4-15. Active Learning Strategies

<ul style="list-style-type: none"> • Think-pair-share • Reciprocal teaching • Gallery review • Jigsaw • Action learning • Discussion boards 	<ul style="list-style-type: none"> • Role plays • Debriefing—Independent/group • Games and simulations • Presentations with group participation • Fishbowl
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Adapted from Silberman M, Auerbach C. *Active Training: A Handbook of Techniques, Designs, Case Examples, and Tips*. 3rd ed. San Francisco, CA: John Wiley & Sons; 2006; Johnson D, Johnson R. *Active Learning: Cooperation in the College Classroom*. Edina, MN: Interaction Book Company; 1991; Millis BJ. Cooperative learning structures. Available at <http://www.utexas.edu/academic/dlia/research/projects/hewlett/cooperative.php>. Accessed June 16, 2009.

engage in more active learning in your physical therapy classes than you did in your prerequisite science or liberal arts classes. Why? Usually, classes that focus on specific motor skills like transferring a patient from a bed to a chair include practice opportunities that are inherently active. Case-based activities, problem-based strategies, simulations, and standardized patients are all examples of active learning strategies commonly seen in the classroom. It may be more of a challenge to integrate one or more active strategies into a class that is traditionally taught in a lecture format, although the literature is replete with examples of active learning strategies being incorporated even into the more traditional classroom setting.^{39,49-54} Table 4-15 lists a number of active learning strategies that can be used successfully in almost any class. We will describe a few popular examples here. For a full description of the active learning strategies listed, see Silberman and Auerbach's⁶ *Active Training* text.

Most of us have experienced the *think-pair-share* strategy without knowing its name. It requires individuals to reflect on a teacher's question or comment for a minute or so and then turn to a neighbor, someone sitting nearby, to discuss one another's thoughts or responses. The instructor then asks for a few people to share their thoughts or experience with the larger group. It takes only a few minutes in total and can be adapted to respond to anything the instructor thinks is relevant. For example, the instructor might ask individuals to think back over the preceding 20 to 30 minutes of lecture and identify any information or concept that remains confusing for them. When they exchange that information with a neighbor, there is an opportunity for some of the confusion to be clarified by the neighbor. If a number of students have questions about the same concepts, the instructor obtains valuable feedback and can clarify for the group before moving on to other material.

Modifications of this approach that ask students to indicate confusing or *muddy points* periodically during a lecture class have resulted in improved achievement in physical therapy students. Instead of asking pairs of students to discuss or clarify muddy points, other university instructors have required students to solve

multiple-choice questions midway through a lecture. Students answered 1 or 2 questions soon after the information had been delivered by lecture. The students responded to the questions as individuals and then in pairs. Achievement in classes where this active strategy was employed was greater than in other physiology classes of equivalent students where straight lecture was the teaching method.^{37,54}

Reciprocal teaching refers to any of several techniques that involve learners taking turns explaining to one another what they have learned about a topic, through reading or listening.^{6,32,46,49,56} For example, during a lecture about various manual muscle tests, pairs of students periodically could take turns explaining and demonstrating a particular manual muscle test to each other.

Another strategy might be for the instructor to ask the learners to pretend that the person next to them just arrived to class and missed the last 20 minutes of the lecture. The group would be split in half, and half of the group would be asked to summarize the major points and share it with their partners. A variation of this technique can be used in a workshop with a large number of participants who do not know each other.³² Before the presentation begins, participants are asked to schedule a number of meeting times with different people for specified times throughout the workshop. When each pair meets, someone is designated *A* and the other person is *B*. At the appointed hour, participants are told to meet with their partners for that time slot. Person *A* is required to teach Person *B* about one aspect of a topic that had been taught earlier. Person *B* then has the opportunity to teach another aspect of the topic to Person *A*. Each person can ask questions, and if any confusing points remain, the instructor of the large group can clarify the information.

Both think-pair-share and reciprocal teaching can be quite brief and interspersed throughout a presentation. They would be appropriate activities to help process information during those periods described by Sousa³⁰ as downtimes. If participants know that this activity is coming, they will more likely focus on the content being presented so they can teach it to their peer effectively. Requiring learners to move to find their partners can

also reenergize the classroom, effectively minimizing the downtime experienced by the participants.

These are both effective ways of keeping the learner engaged in the presentation. A similar strategy can be used at the end of a laboratory class. Students stand in a circle, and one by one the instructor asks each one to explain a certain concept or demonstrate a technique that was presented. If the students are aware that this is going to happen, they will more likely attend throughout the session. Using this strategy can also help the instructor assess how much the students learned. It is important, however, to make this process a learning process. Creating a safe environment where students feel supported if mistakes are made is critical to the learning process.

Stop and Reflect

Have you ever participated in a workshop in which the large group was broken into several smaller groups for discussion and at the end of the discussion each small group was then asked to report their findings? After the third group reported the same findings, what did you do? Did you tune out?

In response to the “Stop and Reflect” box, did you indicate that, by the third report out, you tuned out? This is not an uncommon experience. The *gallery review* is a multistep strategy that has a visual component that serves as an alternative to having small groups verbally report their responses to a question or task. The gallery review omits the repetitive report out while simultaneously facilitating ongoing discussion across groups. There are many variations of this technique.⁵⁵

One variation we have used is to ask small groups of workshop participants to brainstorm how they, as clinical instructors, would create an ideal orientation for a doctor of physical therapy student’s first clinical internship. Participants discuss possibilities in their small groups and reach consensus on key components. They write the key components (in detail) on large chart paper, which they post on the wall. After all groups have posted their “ideal orientation,” they move from one poster to another and comment on, or raise questions about, the various plans. They view the posters as though they were in an art gallery, and they discuss each as they might discuss the work of various artists.

Another variation we have used is to ask participants to move in their small groups from one poster to another. As they visit each poster with their group, we ask them to discuss it and add a checkmark to each poster with a checkmark if they see something that they had already included in their own poster, a question mark after a comment they had questions about, a triangle or

delta sign if they saw something that made them think differently, and an asterisk after a point they thought was outstanding. This facilitates further discussion and engages the entire group. The instructors can simultaneously view the gallery and then simply summarize the major points of the activity in the large group.

Jigsaw groups are a staple of cooperative learning activities.^{46,57} Originally developed to promote improved cross-cultural relationships in college classrooms,^{58,59} the jigsaw has several key components and can be used to facilitate growth in the affective, cognitive, and psychomotor domains.^{39,46}

- Participants are assigned initially to a base group where they take a few minutes to get to know the members of their group.
- Each group member is then assigned to a second group. Participants in this second group will be considered the “content experts.” There will be several homogeneous content expert groups, and each is assigned to master a specific chunk of content. The role of the content expert group is to synthesize the information assigned and develop sufficient expertise on the content so they can teach their peers.
- Once the content expert groups have developed sufficient expertise, they return to their original base group, which now consists of at least 1 member of each content expert group. At this point, group members are expected to take turns and share their expertise by teaching one another what they had learned. In this way, all participants gain expertise in all of the assigned content.
- At the conclusion of this activity, the instructor can choose to summarize the content, have students summarize the content, or assess student learning in a number of other ways.

We have used this technique to present a variety of different topics. For example, we have used this technique in teaching neonatal reflexes. Rather than lecturing on and demonstrating each of the reflexes, a framework is provided, and students are assigned to groups using the jigsaw process to learn and then teach each other the reflexes. The content is then reinforced by quizzing students in a competitive, yet fun, manner. Finally, to summarize and reinforce the content, students watch a videotape demonstrating the reflexes in a typically developing newborn.

The jigsaw activity requires participants to meet in at least 2 different groups and to teach as well as to learn new material. The technique strengthens interpersonal and cognitive skills. It provides a useful alternative to lecturing for hours on a given topic. To ensure success, the material to be learned has to be easily distributed in equivalent amounts to participants. It is helpful to shorten one section of the material to make

it more manageable for students whose first language is not English. There needs to be sufficient time for group members to read through their material, discuss the readings with others, and finally to return to their original group to take turns teaching one another.

We have used the jigsaw technique not only to teach new material but as an assessment at the end of a multi-day continuing education course. In this instance, participants bring all their handouts and course material on the final day of the course. They count off and form base groups. They are given time to review quietly by themselves first. They then are assigned to 1 of 4 content expert groups, which represent each of the 4 days of the course. In the day 1 expert group, for example, participants review the key points and concepts presented that day. Other groups are focusing on days 2, 3, and 4, respectively, and are determining the most important points from those days. Once the experts in each of these groups have determined the key points, they return to their base groups. The base group then has approximately an hour to review the key points from each day and to develop a strategy for synthesizing and integrating the essential information from the entire course into a song, skit, poem, or mural. This end-of-course jigsaw culminates in a variety of unique presentations that are novel, fun, and meaningful to the learners. This activity re-engages both meaning and emotion. Students are challenged to distill and synthesize the material in a meaningful way and have fun doing so, again reinforcing retention of the content.

Critical Thinking Clinical Scenario

You are teaching a lab section on bed mobility skills in patients with varying levels of spinal cord injury in a neuromuscular class. You have asked the students to work in pairs to practice these skills. They try the technique once, and tell you they have finished practicing. In your next class session, you ask pairs of students to demonstrate what they learned in the last class. Most students perform the skills incorrectly.

Reflective Questions

1. Why do you think the students did so poorly in the subsequent class?
2. Why do you think the students took so little time to practice?
3. What could the instructor have done to encourage more practice time?

Skills laboratory sessions are active learning activities commonly used in educating students in all of the health professions. Managing skills laboratory sessions effectively represents a challenge for many instructors. On the one hand, laboratory sessions provide

wonderful active learning opportunities. On the other hand, making the most of these opportunities requires more structure than many instructors realize. Laboratory sessions require as much planning as, if not more than, your lecture presentation. Students are often noted to consider 1 or 2 attempts at a task sufficient for skill acquisition, or they may limit their practice to those classmates with whom they are most comfortable. Realizing these common student perspectives, it is essential for you to determine the skills you want students to be able to demonstrate and to plan activities that support these goals. Structuring the laboratory session using a variety of active learning strategies can help minimize the "I already did it" response.

It is not uncommon for faculty to struggle to develop strategies to keep all students engaged and accountable throughout the laboratory session. At a recent faculty retreat, we discussed strategies for managing the skills laboratory. Below are some examples of strategies that faculty found effective. These same strategies can be adapted for use in a variety of teaching-learning situations, not just the skills laboratory:

- Providing clear expectations (objectives for each lab).
- Establishing stations for students to rotate through with different activities with measures of accountability at each station.
- Establishing a rotation schedule in which students must work with at least 4 to 5 different partners before they have completed the rotation.
- Dividing the whole group into several pods or clusters. Within each cluster or pod, direct students to perform one activity in pairs. Switch partners for the next activity. At the end of 2 to 3 activities, ask students within each cluster to discuss the strengths and weaknesses of their own performances. Encourage them to practice the more difficult skills with help from their peers.
- Assigning leaders in each pod responsible for managing the pod and keeping students on task at each station. Rotate the leaders periodically throughout the session.
- Using peer or faculty sign-off sheets with a list of skill competencies that need to be practiced. Require each student to have at least 3 people sign off that they observed the student perform the skill accurately.
- Using peer teaching strategies (eg, jigsaw).
- Having the instructor and teaching assistants circulate around the room in a predictable manner so they do not remain with one group for too long, leaving little time for the other groups.
- Asking students to demonstrate a skill or answer a question on-the-spot.

- Using on-the-spot questions as a large group at the end of the laboratory session both as a summary and a means of keeping students accountable.
- Having students call out answers at the end of the session and having students give each other feedback on the answers or demonstration.
- Lining students up in pairs in a line so you can quickly walk up and down and observe them performing a specific technique.
- Having students continually switch partners in an organized manner, not randomly (eg, one student shifts to the right).
- Using index cards with specific tasks, have each student pull a card and demonstrate.

Another strategy that faculty found both important and effective in maintaining student engagement throughout the laboratory session is ensuring that a mechanism of accountability is in place. If students know they will be responsible for demonstrating a skill or answering a question either during the laboratory session or at the end of the session, they are more likely to attend throughout. Some of the activities noted above can function to both keep students on task as well as maintain accountability. Examples of strategies for maintaining accountability in the skills laboratory that faculty have found effective include the following:

- Using “call outs” whereby students are expected to call out the answer to questions related to the day’s laboratory session.
- Incorporating worksheets or checklists of activities to be completed by each student during the laboratory session.
- Using peer or faculty assessment checklists or sign-off sheets.
- Using on-the-spot questions either throughout the laboratory or at the end of the laboratory. These on-the-spot questions may also require the students to demonstrate a selected skill.
- Completing self-assessment sheets.
- Assigning 1 person to keep notes of questions or challenging activities that can be raised when it is the group’s turn to meet with the instructor.

As noted above, it is critical for the instructor and lab assistants to systematically and predictably circulate among the students, observing, asking questions, answering questions, and providing assistance when appropriate. This is to ensure that all groups receive equal attention. Novice instructors are often caught responding to the groups as they raise their hands or spending so much time with one group that others are missed. This can be frustrating for students who are waiting and have questions. Being systematic and predictable helps you ensure that during the laboratory session, the needs of all students are being met.

It also assures the students that their turn will come. Assigning a student to keep notes of the group’s questions and struggles throughout the session can make your session with each group move more efficiently as well. Rotating among each of the groups can provide you with valuable information about the students’ skill acquisition as you observe them, thus obtaining an informal assessment of their progress.

Keeping students actively engaged and on task throughout the laboratory session or throughout any active learning activity requires significant planning, structure, and explicit instructions. Just as you create learning objectives and a plan for your presentations, it is important to create learning objectives and a plan for your laboratory sessions.

Key Points to Remember

- Maintaining student engagement and on-task behavior throughout any active learning activity requires significant:
 - Planning
 - Structure
 - Explicit instructions
- Including measures of accountability can help to maintain on-task behaviors.
- Just as you create learning objectives and a plan for your presentations, it is important to create learning objectives and a plan for your laboratory sessions.

Summaries

Just when it seems that you are nearing the end of your instructional design, you have one more important component to consider: the summary. Based on your middle and high school experiences, some of you might think that the conclusion of instruction is when the bell rings! Nothing could be less effective for pulling together the essential points of an instructional period.

What, exactly, is a summary? Wormeli⁶⁰ defined summarization as “restating the essence of a text or experience in as few words as possible or in a new, yet efficient, manner.” There is evidence that using a summary positively impacts student achievement.⁶¹ Based on a meta-analysis of more than 100 studies that examined the impact of various school and instructional strategies on student achievement, Marzano et al⁶⁰ found that the strategies that most affected student achievement after “identifying similarities and differences” were “summarizing and note-taking.” Devoting an entire book to summarization, Wormeli⁶⁰ related the impact of summaries to the primacy-recency effect described by Sousa³⁰ and discussed earlier in this chapter. Because we remember best the information presented at the beginning (primacy), and second best