Principles and Methods of Educating Health Care Professionals

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Seattle, Washington
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Learning Objectives

1. Identify historical and current factors influencing the need for pharmacists to be better teachers, educators, and preceptors.
2. Apply educational frameworks and evidence-based methods to design instruction for didactic courses and experiential learning.
3. Describe strategies to promote experiential learning such as role modeling, mentoring, coaching, and precepting.
4. Apply best practices of assessment when designing assessments to measure achievement of learning outcomes.

Self-Assessment Questions

Answers and explanations to these questions can be found at the end of this chapter.

1. Which of these factors is influencing the need for pharmacists to be better teachers, educators, and preceptors?
   A. A decrease in demand for pharmacists.
   B. A reduction in the number of schools and colleges of pharmacy.
   C. Current Accreditation Council for Pharmacy Education (ACPE) requirements for faculty and preceptors.
   D. Static roles for pharmacists.

2. The following statements best demonstrate which educational framework?
   Learning objective = Select therapies to treat a patient’s diabetes
   Instructional strategy = Given a diabetes case, students choose therapy for that patient and get expert feedback on their choices
   Assessment strategy = Examination questions where students are given a patient case and asked to select the most appropriate diabetes therapy for that patient
   A. Ability-based education.
   B. Instructional alignment.
   C. Learner-centered teaching.
   D. Mastery learning.

3. The Preceptor’s Handbook for Pharmacists definition of mentoring best applies to the relationship of the pharmacist and:
   A. The Advanced Pharmacy Practice Experience (APPE) student.
   B. The Introductory Pharmacy Practice Experience (IPPE) student.
   C. The pharmacy intern.
   D. The pharmacy resident.

4. Of Bloom’s levels of cognitive thinking, multiple choice questions are most easily written to measure:
   A. Analysis.
   B. Application.
   C. Comprehension.
   D. Knowledge.

5. Which educational framework best describes the progression of learning in an experiential environment?
   A. Bloom’s taxonomy.
   B. Fink’s taxonomy.
   C. Krathwohl’s taxonomy.
   D. Miller’s pyramid.

6. Which statement is supported by educational evidence?
   A. Experiential learning includes regular episodes of active learning.
   B. Frequent assessment and feedback lead to better learning outcomes.
   C. There is no difference in learning outcomes between similar instructional strategies used with different generations of learners.
   D. Shorter, punctuated lectures can achieve learning outcomes similar to those of typical, longer lectures.

7. A new preceptor will be welcoming his first APPE student on rotation in a week. He seeks advice from some more experienced preceptors on how to prepare. Which of the following is the best advice he receives?
   A. Contact the student’s school to learn any information about the student that will help the preceptor optimize the student’s learning.
B. Create a syllabus that lists expectations and other details for the student on the rotation.
C. Have the student shadow the preceptor for at least the first week.
D. Prepare a list of projects for the student to complete when not involved in direct patient care activities.

8. The same preceptor notices the student struggling with certain activities and is trying to decide the best way to provide feedback to the student. What should the preceptor do?
   A. Ask the student to prepare a written self-assessment of how he or she thinks the activities have gone thus far, to be discussed with the preceptor the next day.
   B. Have the student work with another preceptor to see whether the same problems exist before providing feedback.
   C. Pull the student aside as soon as possible and open a specific, objective, and constructive dialogue about the preceptor’s observations.
   D. Use the school’s evaluation system, which usually includes an online midrotation evaluation that will be sent to the student.

9. The preceptor wants to work on developing students’ critical thinking skills during the rotation. An evidence-based technique to do this is:
   A. Ask-tell-ask.
   B. 1-minute preceptor.
   C. Simulation.
   D. Think-pair-share.

10. A pharmacist is asked to put together a continuing education session for other pharmacists on the topic of antimicrobial resistance. Based on good educational practice, what should be the first step in designing the session?
    A. Create a lesson plan outlining what will happen during the session.
    B. Create learning outcomes for the participants.
    C. Design the assessment questions to be asked of the participants.
    D. Determine how to incorporate active learning into the session.

11. The design of assessments should be based primarily on which of the following?
    A. Competency level of the learners.
    B. Stated learning objectives or outcomes.
    C. Purpose of the assessment: formative or summative.
    D. Manner in which learners learned the material.

12. A new pharmacist-instructor wants to develop critical thinking, collaborative inquiry, and self-guidance abilities in her students to promote better clinical decision making for her cardiovascular module. She asks for your guidance on educational techniques to do this in a classroom setting. Which of the following should she try?
    A. Case-based learning.
    B. Flipped classroom.
    C. Problem-based learning.
    D. Team-based learning.

13. Based on the learning outcomes this instructor is trying to achieve with her students, which of the following would be the best assessment of students’ learning for this module?
    A. A written essay examination where students are presented with cardiovascular patient cases and asked to work them up.
    B. An oral examination involving students’ presentation of a cardiovascular patient case with the student’s recommendations, followed by questions of faculty.
    C. Observation of the students in the clinical setting when working up a patient case with cardiovascular problems.
    D. Using a rubric designed to measure learning outcomes, observe students working with a team to solve a cardiovascular patient case.
OVERVIEW
The purpose of this review is to improve the clinical pharmacist’s abilities in his or her roles as a teacher, educator, and preceptor.

1. INTRODUCTION
This section elucidates the historical and current factors influencing pharmacy practice and education and explains why pharmacists need to have a better understanding of education and training to be good teachers and preceptors. Figure 1 shows factors that influence the need for pharmacists to become better educators.

![Figure 1](image)

**Figure 1.** Historic and current factors influencing the need for pharmacists to become better teachers and preceptors.

A. Pharmacists have always been educators. One of the pillars of the profession has been to provide education to patients and providers about medications and health. In the last 20–30 years, the movement by pharmacists to provide clinical services has been paralleled by an emphasis on how to best educate and train student pharmacists and to educate prescribers and other health care providers. This chapter focuses primarily on the pharmacist’s role in educating student pharmacists, but many of the strategies described also apply to educating other health care providers.

1. Historically, pharmacy education began as apprenticeships, then transitioned to become primarily university-based learning. This occurred as evidence-based knowledge increased and standardization became important. Pharmacy education has continued to evolve into the current model, which is a hybrid of the two education or training paradigms.

2. As the role of the pharmacist evolves, so must the education and training of student pharmacists.

3. Two primary forces have recently changed the landscape of pharmacy education:
   a. Increased demand for pharmacists caused by population growth, especially in the older adult population
      i. To meet this demand, existing schools and colleges of pharmacy expanded their enrollments, and many new schools opened.
      ii. Current data suggest that the supply might now be outpacing the demand.
b. Transition from the 5-year Bachelor of Science degree to the minimum 6-year Doctor of Pharmacy degree as the entry-level practice degree
   i. There was much debate among pharmacists and pharmacy associations about whether this was an appropriate step.
   ii. The resulting transition was the most significant educational shift at the turn of the 21st century.

B. The transition to the Doctor of Pharmacy (Pharm.D.) degree and concurrent expansion of education and training programs have led to a demand for pharmacy faculty, with the greatest growth in positions available for clinician-educators.
   1. As a result, many new pharmacists graduating from residencies have found themselves in these shared clinical faculty positions, with immediate responsibilities for teaching and precepting student pharmacists and residents.
   2. At the same time, the greater emphasis on education has led to increased focus on educational research that suggests that traditional academic methods (primarily learning through passive lectures and periodic examinations) will not suffice to prepare students for clinical practice and team-based care.
   3. Therefore, there is a need to better prepare current and future pharmacists to be excellent teachers and preceptors, for two reasons.
      a. As mentioned earlier, student pharmacists need to be prepared for a future of clinical and team-based practice.
      b. Many pharmacists engaged in pharmacy education may not have received much formal education or training in teaching and precepting.

II. BACKGROUND

A. This section describes the importance of the Accreditation Council for Pharmacy Education (ACPE) and some of the pertinent ACPE requirements for faculty, preceptors, and pharmacy school curricula, of which all faculty and preceptors should be aware. Greater detail can be found in the ACPE “Standards 2016.” ACPE is the primary regulatory body for pharmacy education, both for Pharm.D. and continuing pharmacy education programs. Pharm.D. graduates cannot register for or take the North American Pharmacist Licensure Examination if they have not graduated from an ACPE-accredited school or college of pharmacy.
   1. ACPE’s standards have evolved to push education forward (and hopefully practice, via graduates) above and beyond ensuring minimal competence to practice as an outcome of training and education from accredited schools.
   2. ACPE standards are heavily influenced by academic and practice leadership and membership.

B. ACPE Requirements for Faculty and Preceptors: Although ACPE does not require all faculty and preceptors affiliated with pharmacy schools to have received formal training in education, it does have three standards that directly address the quantitative and qualitative factors of faculty, staff, and preceptors.
   1. Standard 19: Faculty and Staff—Quantitative Factors. “The college or school must have a cohort of faculty and staff with the qualifications and experience needed to effectively deliver and evaluate the professional degree program.”
   2. Standard 20: Faculty and Staff—Qualitative Factors. “Faculty and staff must have academic and professional credentials and expertise commensurate with their responsibilities to the professional program and their academic rank.”
   3. Standard 21: Preceptors. “The college or school must have a sufficient number of preceptors (practice faculty or external practitioners) to effectively deliver and evaluate students in the experiential component of the curriculum. Preceptors must have professional credentials and expertise commensurate with their responsibilities to the professional program.”
C. ACPE Requirements for Didactic and Experiential Curricula: Although ACPE does not dictate exactly what and how curricula are taught, it has standards that are meant to guide schools in designing and implementing didactic and experiential curricula. Certain parts of these standards directly affect individual faculty and preceptors.

1. Standard 10: Curricular Design, Delivery and Oversight. “The curriculum must be designed, delivered, and monitored by faculty so as to ensure depth and breadth of requisite knowledge and skills, development of professional attitudes and behaviors, and the opportunity to explore professional areas of interest. Curricular expectations must emphasize active learning pedagogy, content integration, knowledge acquisition, application of knowledge to therapeutic decision-making, and the maturation of professional attitudes and behaviors.”

2. Standard 12 talks about the Pre-APPE curriculum, and Standard 13 focuses on Advanced Pharmacy Practice Experience (APPE).
   a. Standard 12: Pre-APPE Curriculum. “The Pre-APPE curriculum must provide a rigorous foundation in the biomedical, pharmaceutical, social/administrative/behavioral and clinical sciences and incorporate Introductory Pharmacy Practice Experience (IPPE) in order to prepare students for Advanced Pharmacy Practice Experience (APPE).”
   b. Standard 13: APPE Curriculum. “APPE must integrate, apply, reinforce, and advance the knowledge, skills, attitudes, abilities, and behaviors developed in the Pre-APPE curriculum and in co-curricular activities.”

3. Another ACPE standard that may affect many faculty and preceptors is Standard 11, about interprofessional education and training.
   a. Standard 11: Interprofessional Education. “The curriculum must prepare all students to provide entry level patient-centered care in a variety of practice settings as a contributing member of an interprofessional team. In the aggregate, team exposure must include prescribers, as well as other health professionals.”
   b. This is a recent requirement for schools and colleges of pharmacy, having only been formally introduced in the set of accreditation standards before this one.
   c. The impact on schools and their faculty and preceptors is significant. Faculty should consider how to work with other professions’ faculty to incorporate interprofessional opportunities and coursework into their curricula. Preceptors need to work with other health care professionals to increase student pharmacists’ opportunities to provide coordinated care to patients as part of a team.

In summary, pharmacy faculty and preceptors should be aware of these ACPE standards and do their best to work with their affiliated schools to achieve them.

III. EVIDENCE SUPPORTING TEACHING, PRECEPTING, AND LEARNING

Faculty and preceptors need to be familiar with evidence that supports didactic and precepting strategies used in health professionals’ education. Similar to the practice of evidence-based medicine, where clinicians use robust evidence to support their patient care decisions to promote the best possible outcomes, evidence-based education suggests that teachers, preceptors, and administrators need to use evidence not only in the content of what is taught or practiced but also in the process of teaching and learning to promote the best learning outcomes.

B. Key findings from research that can inform your teaching and precepting
   1. Good teaching and precepting can promote better learning outcomes.
   2. A one-size-fits-all approach to teaching and learning does not work as well as using multiple strategies.
3. Millennials and younger generations are not as satisfied with traditional learning approaches, so their learning potential may be better achieved with more current strategies.
   a. Their K–12 education has evolved to include more technology and newer approaches to teaching and learning.
   b. Society’s culture has evolved rapidly, while higher education has not.
4. A student-centered model promotes better learning outcomes than a teacher-centered model.
5. Instructional alignment can promote better learning outcomes.
6. Active learning promotes better learning outcomes (e.g., retention, application) than passive learning (e.g., sitting in a lecture, possibly even with note taking).
7. Long lectures (even as short as 50 minutes) do not hold students’ attention as well as short, punctuated lectures.
8. Providing context and establishing relationships to practice and other content areas promotes better learning (e.g., vertical and horizontal integration).
9. Thoughtful repetition and scaffolding (i.e., going from simple to complex in a logical sequence) can promote better learning outcomes.
10. Using readings with targeted questions or guides promotes better learning outcomes than assigned readings alone.
11. Frequent assessment with feedback leads to better learning outcomes.
12. Specific, objective, immediate feedback can improve learning outcomes.
13. Critical thinking is best developed through modeling and demonstration.
14. Writing improves critical thinking and learning retention and application.

IV. CURRENT EDUCATIONAL FRAMEWORKS AND GUIDING PHILOSOPHIES

A. Learner-Centered (vs. Teacher-Centered) Teaching
   1. Defined as a focus on:
      a. What the student is learning
      b. How the student is learning
      c. The conditions under which the student is learning
      d. Whether the student is retaining or applying the learning
      e. How current learning prepares the student for future learning
2. Characteristics can be seen in Table 1.

<table>
<thead>
<tr>
<th>Teaching Paradigm</th>
<th>Learning Paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stored knowledge model</td>
<td>Constructed knowledge model</td>
</tr>
<tr>
<td>Content centered</td>
<td>Ability centered</td>
</tr>
<tr>
<td>Instructor oriented</td>
<td>Student oriented</td>
</tr>
<tr>
<td>Didactic teaching</td>
<td>Active, experiential learning</td>
</tr>
<tr>
<td>Professional training</td>
<td>Professional education</td>
</tr>
</tbody>
</table>

Table 1. Characteristics of Teacher- and Learner-Centered Education Models


3. To use the learner-centered model, faculty and preceptors need to consider themselves as coaches and facilitators rather than fonts of knowledge and wisdom from which learners drink (or are sprayed!).
B. Ability-Based Education (ABE)
   1. Defined as an educational strategy that focuses on development of students’ abilities (rather than knowledge only) and uses assessment as part of the learning process, not just as a finale.
      a. An ability includes the components of knowledge, skill, and attitude.
      b. A learning outcome is defined as a statement that describes what a learner should be able to do at the end of a program.
      c. An ability-based outcome (ABO or ability outcome) is a learning outcome that combines knowledge, skills, and (possibly) attitudes.
   2. Many schools use ABOs at one or more levels.
      a. At the programmatic, graduation, or terminal outcome level (e.g., “Graduates from this program will be able to . . .”)
      b. At the year level (e.g., “At the end of year 3, student pharmacists will be able to . . .”)  
      c. At the department or division level (e.g., “After a series of courses in XX department, student pharmacists will be able to . . .”)
      d. At the course or rotation level (e.g., “By the end of this course or rotation, student pharmacists will have . . .”)
      e. At the lecture, assignment, activity, or project level (e.g., “By the end of this lecture, assignment, activity, or project, student pharmacists will have . . .”)
   3. Ideally, each set of ABOs is mapped back to the set that precedes it (Figure 2). This helps ensure that all ABOs are being covered in curricula, and unnecessary material is reduced.
      a. Typically the compilation of all lecture, assignment, activity, or project ABOs for any given course or rotation maps back to the course- or rotation-level ABOs so that the course master or primary preceptor knows that all course or rotation ABOs have been met by those lectures, assignments, activities, or projects. An example is seen in Figure 3.
      b. Similarly, all course and rotation outcomes combined for any given academic year (or program, such as IPPE or APPE) should map back to the academic year or department or division outcomes, so that all academic year or department or division outcomes have been met.
      c. Lastly, all academic year and department or division outcomes (or all course or rotation outcomes if academic year outcomes are unavailable) should map back to the program- or graduation-level outcomes.

![Diagram](image-url)

**Figure 2.** Relationship of individual learning activities’ ABOs to program- or graduation-level ABOs.
Figure 3. Example of relationship of course activities to activity-specific outcomes to a course ABO.

4. Developing abilities in your students (i.e., practicing ABE): Figures 4 and 5 show examples for a didactic course and experiential rotation.
   a. Write ABOs, then write specific objectives for each ABO that break down the ability into its knowledge, skill, or attitude. Each objective should contain only one idea (e.g., knowledge, skill, or attitude).
   b. Design instruction and assessments for students to develop these objectives (e.g., lectures, assignments, projects, activities, reviewing old examinations) that allow them to “practice” the objective.
   c. Create explicit criteria used to evaluate achievement of the objective, so students know how they will be assessed.
   d. Provide students feedback based on the criteria, so they know how and where to improve their performance. Feedback should be:
      i. Specific
      ii. Objective
      iii. Constructive
      iv. Timely
<table>
<thead>
<tr>
<th>Course Outcome</th>
<th>Assignment Outcome</th>
<th>Practice or Assignment</th>
<th>Criteria</th>
<th>Feedback to Student</th>
</tr>
</thead>
</table>
| • Select and recommend appropriate antimicrobial treatment for common infections | • Select and recommend appropriate antimicrobial treatment for acute, gram-negative pyelonephritis | • Based on an assigned clinical case study describing a patient with acute, gram-negative pyelonephritis, students are asked to recommend appropriate antimicrobial therapy | • Recommendation includes correct dose, route, and duration of treatment  
• Justification of dose is based on type of infection, desired serum levels, and both drug- and patient-specific pharmacokinetic considerations  
• Rationale for duration of treatment is based on natural history of pyelonephritis, desired clinical end points, and standards of treatment  
• An end point for intravenous therapy is provided, together with guidelines for switching to oral treatment  
• Drug selection is justified based on spectrum of activity  
• Explanation for ruling out other antimicrobials is provided and includes drug-specific and patient-specific data | • Based on the criteria, feedback should include specific, evidence-based objective feedback on  
• What was successful and why  
• What behaviors need to be improved and how |

Figure 4. Example of ABE in a pharmacotherapy course.
### Course Outcome
- Select and recommend a comprehensive drug therapy plan

### Assignment Outcome
- Recommend drug therapy
- Explain rationale for drug therapy
- Develop therapeutic goals
- Recommend nondrug therapy
- Develop monitoring plan

### Practice or Assignment
- Based on patient observation, interview, and review of chart of patient with acute, gram-negative pyelonephritis, students are asked to select and recommend a comprehensive drug therapy plan and discuss with preceptor and resident

### Criteria
- Recommendation includes correct dose, route, and duration of treatment
- Justification of dose is based on type of infection, desired serum levels, and both drug- and patient-specific pharmacokinetic considerations
- Rationale for duration of treatment is based on natural history of pyelonephritis, desired clinical end points, and standards of treatment
- An end point for intravenous therapy is provided, together with guidelines for switching to oral treatment
- Drug selection is justified based on spectrum of activity
- Explanation for ruling out other antimicrobials is provided and includes drug-specific and patient-specific data

### Feedback to Student
- Based on the criteria, feedback should include specific, evidence-based objective feedback on
  - What was successful and why
  - What behaviors need to be improved and how

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**Figure 5.** Example of ABE in an acute care clerkship.

5. Instructional alignment
   a. Similar to ABE, defined as ensuring your learning objectives, the assessment of those learning objectives and the instructional strategies are aligned (Figure 6).
   b. An example of instructional misalignment can be seen in Figure 7.

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**Figure 6.** Diagram of instructional alignment.
6. Mastery learning
   a. Defined as mastering a set of content or learning objectives before moving on to the next learning unit
   b. This is contrasted to traditional education models where “mastery” of subject matter may not be expected; students earn a passing score to move on but may not have truly mastered the material.
   c. This model is most similar to competency-based education where students are measured via achievement of certain criteria (criterion-referenced) rather than being compared with each other (norm-referenced).
   d. When applied to professional and graduate education:
      i. Capable students are competitively admitted to a program, and the program and the student have mutual responsibility for the students’ success in the program.
      ii. Some pharmacy programs use mastery learning with an integrated, blocked curriculum. Students must demonstrate mastery of a block before successfully moving to the next block.
      iii. The learning environment should be supportive rather than trying to “weed people out.”
   iv. Student-centered and ABE models can promote mastery.
   v. Traditional education does not necessarily support mastery learning.

7. Bloom and Krathwohl’s and Fink’s taxonomies and Miller’s pyramid: These taxonomies have been used widely in education as a way to design, assess, and diagnose student learning. They provide some structure and focus to teaching and learning.
   a. Educational psychologist Benjamin Bloom and colleagues originally defined levels of learning for three different learning domains (Figure 8).
      i. The cognitive domain is the most widely used in education.
      ii. These taxonomies can be extremely helpful when creating objectives, instruction, and assessments (e.g., examination questions) designed to tap into specific levels of learning (Figure 9).
Figure 8. Bloom and Krathwohl’s taxonomy of learning.

Figure 9. Bloom’s cognitive taxonomy (levels with numbers), associated verbs used for objectives (inner set of words), and potential instructional strategies to achieve those objectives (outer set of words).
b. L. Dee Fink created a more recent taxonomy to denote significant learning (Figure 10).
   i. According to Diana Ayling, the advantages of Fink’s approach are:
      (a) Integration of the graduate profile knowledge, skills, and attributes in the course
      (b) A strong design phase that means less work in the assessment, facilitation, and evaluation phases
      (c) Clearly identified learning goals that guide the teacher and the student
      (d) Good practice in feedback and assessment
      (e) Clearly identified “substantive” assessment that assesses a number of learning goals at once
      (f) Active learning experiences for students and plenty of learner practice
      (g) Development of rich learning experiences where significant learning can occur
      (h) The practice of in-depth reflective dialogue
      (i) Development of logical course structure and instructional strategies
      (j) A strong focus on communication with students
   ii. This taxonomy and process are similar to learner-centered teaching, ability-based education, and instructional alignment.

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**Figure 10.** Fink’s taxonomy of significant learning.

(a) Miller’s hierarchy of learning (Figure 11)
   (1) Originally created for medical students
   (2) Often used in experiential and practical education
Principles and Methods of Educating Health Care Professionals

ACCP Updates in Therapeutics® 2018: Pharmacotherapy Preparatory Review and Recertification Course

MILLER’S PRISM OF CLINICAL COMPETENCE (aka Miller’s Pyramid)

it is only in the "does" triangle that the doctor truly performs

Based on work by Miller GE. The Assessment of Clinical Skills/Competence/Performance; Acad. Med. 1990: 65(9): 63-67
Adapted by Drs. R. Mehay & R. Burns. UK (Jan 2009)

Figure 11. Miller’s pyramid. MCQ = multiple choice question; OSCE = objective structured clinical examination.

V. DESIGNING INSTRUCTION TO ACHIEVE LEARNING OUTCOMES

Whether you are teaching in the classroom or precepting students at your practice site, you should deliberately plan learning experiences for your students.

A. Questions to Ask Yourself
   1. What can students do that will help them to achieve my learning outcomes and objectives (refer to ABE model)?
   2. What is realistic for them to do (e.g., consider workload, credit load)?
   3. How much constructive feedback can I give them (e.g., consider how many subjective, objective, assessment, plan [SOAP] notes you can grade)?

B. Instructional Techniques for the Classroom
   1. Using technology
      a. Will using technology help students to achieve your outcomes and objectives?
      b. Have a backup plan.
      c. A few specific examples (not inclusive list)
         i. Audience response systems
         ii. Phones versus “clickers”
            (a) Free versus not free
            (b) Best used for class engagement and diagnosing understanding
            (c) Not as good for quizzing
         iii. High-fidelity simulation (e.g., robotics, Sim-Man)
iv. Virtual patients
   (a) Electronic medical records
   (b) “Family” databases
v. Social media
vi. Learning management systems (e.g., Blackboard, Canvas)
   (b) Discussion boards, back channels
   (c) Audio and video feedback
   (d) Assignment checking for plagiarism against other assignments
vii. Computerized testing (e.g., via ExamSoft)
viii. Great resource for technology in education

2. Problem-based learning (PBL): This technique has students working in groups in a very self-directed way. Given a particular scenario or problem, students discuss what they already know, identify what they need to know, and decide how and where to access information that will help them solve the problem. Instead of “teaching,” instructors act as “tutors” and support, guide, and monitor the learning process.

3. Team-based learning: This strategy is similar to PBL but is more structured. Students are placed in teams for a time period (e.g., a semester) and are individually responsible for completing readings and outside assignments before meeting with the team in class. Team members take an individual quiz first (individual readiness assurance test) to ensure the outside reading was completed, then take it again with their team (team readiness assurance test).

4. Case-based learning: Similar to PBL but with the use of real-life cases to focus on students’ application of knowledge to work through cases

5. Flipped classroom: This strategy refers to students viewing a lecture or completing a reading outside class, then coming to class to engage in case or other discussions, so that the instructor guides and facilitates during live class time.

6. Other active learning techniques
   a. Enhanced lecture: This technique refers to providing mini-lectures (10–20 minutes) punctuated with active learning strategies (described below) or breaks.
   b. Think-pair-share: This 2- to 5-minute strategy poses a question to students and has them think about it and write down responses individually for a brief time (e.g., 1 minute), then discuss their responses with the person next to them, then share them with the instructor and rest of class.
   c. Muddiest point: After a lecture, mini-lecture, or activity, this brief technique asks students to submit a question (either via paper or electronically) about something that confused them. Students then take a break or are dismissed, while the instructor reviews the questions and responds to those that were most common (either live when meeting again with students or via e-mail or other form of communication).
   d. 1-Minute paper: Similar to the muddiest point, except that students can respond to a few questions, such as, “What is something you learned today that you can use immediately?” “What is something you are still confused by?” “What constructive feedback do you have for the instructor today?”
   e. Pausing: Taking short breaks, even just a minute or so to let students stretch, ask a question, or compare notes, has been shown to improve learning.
   f. Sharing notes: Deliberately have students take a few minutes to share their notes with the person next to them to see differences and discuss them. This is a great collaborative learning technique.
   g. Students write examination questions: They can submit questions based on your learning objectives for an upcoming quiz or examination. You promise to use a few of the good ones. This is a good study technique for them (especially if they work together and submit several) and can be used either during class for a quick activity at the end of a section of lecture or as an out-of-class assignment.
7. Active learning techniques should be used to help students achieve your learning objectives, not simply to keep them engaged or entertained. Active learning techniques should be selected based on their ability to help students achieve your learning objectives or ability-based outcomes. Active learning techniques also benefit the instructor because they give you a moment or two to collect your thoughts and clarify or add to any previous information.

C. Instructional Techniques for Experiential Learning: Thoughtful, well-planned experiential learning activities can benefit the preceptor as much as the student.

1. Learning styles theory: Have students complete a brief learning style inventory before their first day on rotation, then briefly discuss it with them during their orientation. Like other types of personality or work style inventories, learning style analysis can help preceptors and students understand each other’s styles and where differences can occur. An open discussion can help prevent misunderstandings and frustrations later during the rotation. It can also help the preceptor plan learning activities for the student, based on how he or she learns best.

2. 1-Minute preceptor: This technique was designed to maximize students’ development of critical thinking skills during brief clinical encounters. Preceptors use five “microskills” with learners:
   a. “Get a commitment”—i.e., ask the learner to articulate his/her own diagnosis or plan;
   b. Probe for supporting evidence—evaluate the learner’s knowledge or reasoning;
   c. Teach general rules—teach the learner common “take-home points” that can be used in future cases, aimed preferably at an area of weakness for the learner;
   d. Reinforce what was done well—provide positive feedback; and

3. Ask-tell-ask is a technique that has been used in patient-provider communication to elicit patients’ perspectives and help them make decisions based on information, rather than the health care professional just telling the patient what he or she should do. This technique can also work with preceptors or teachers and students, and it involves asking students what they think about a situation, then sharing your opinion, then asking for student opinion once again (getting their buy-in).

4. Active learning in experiential settings: Experiential learning does not necessarily imply active learning. Some experiential activities are more passive, such as shadowing or observing. Although some passive learning may be necessary, efforts should be made to make experiential learning as active as possible for students to promote the greatest learning outcomes, especially the development of comfortable independence and confidence. Some ideas for active learning during a rotation are found in Table 2.

5. IPPE versus APPE: According to ACPE, the difference between the two lies primarily in the level of students and responsibilities they will have during the experience. Since the inception of IPPE requirements into Pharm.D. curricula, those experiences have often been used to help students learn more traditional roles of pharmacists, whereas APPEs are meant to focus more on clinical patient care.

6. Simulation refers to a learning activity meant to serve as a proxy for real-life practice without actually using real patients or real pharmacies. These activities can be a bridge between students’ didactic learning and real pharmacy practice. More details about using simulations as an adjunct to experiential education can be found in the ACPE “Standards 2016.”
Table 2. Ideas for Active Learning During a Community Practice Experience

<table>
<thead>
<tr>
<th>Dispensing</th>
<th>Dispensing</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Talk to students as you carry out this activity; discuss medications and disease states</td>
<td></td>
</tr>
<tr>
<td>- Have students tell you what they know</td>
<td></td>
</tr>
<tr>
<td>- Discuss other therapeutic options</td>
<td></td>
</tr>
<tr>
<td>- Have students look for medication changes to recommend to physicians</td>
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<tr>
<td>- Make students discuss rationale and evidence for any changes</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Dispensing</th>
<th>Dispensing</th>
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<tbody>
<tr>
<td>- Have students calculate pediatric doses</td>
<td></td>
</tr>
<tr>
<td>- Have students do antibiotic call-back programs</td>
<td></td>
</tr>
<tr>
<td>- Have students master 2 key OTC products per week</td>
<td></td>
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<tr>
<td>- Have students talk to patients about OTCs</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Toxicology Sleuthing</th>
<th>Toxicology Sleuthing</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Identify a “mystery” involving drug product interactions for the student to solve and report on</td>
<td></td>
</tr>
<tr>
<td>- Example: “S Milosovich died of heart attack. Was being treated for heart disease; however, appears to have been taking another stealth medication”</td>
<td></td>
</tr>
<tr>
<td>- Put student on the case of a drug-drug interaction that is possible in patients taking many agents</td>
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<tr>
<td>- Have student provide a detailed explanation of what is going on</td>
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<tr>
<td>- Work with student to see how common these interactions are</td>
<td></td>
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<table>
<thead>
<tr>
<th>Adverse Drug Reporting</th>
<th>Compounding</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Stress importance of preventing errors and learning from errors</td>
<td></td>
</tr>
<tr>
<td>- Have student practice completing MedWatch form, for example</td>
<td></td>
</tr>
<tr>
<td>- Talk to students about the process and how compounded products differ from commercial</td>
<td></td>
</tr>
<tr>
<td>- Involve them in hands-on practice</td>
<td></td>
</tr>
<tr>
<td>- Have them calculate</td>
<td></td>
</tr>
<tr>
<td>- Have them compound at your side</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient Discussions</th>
<th>OTC Formulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Give student typical yet complex patients to research (2 per week)</td>
<td></td>
</tr>
<tr>
<td>- Have them assess patient, determine patient needs, develop care plans, and implement plan</td>
<td></td>
</tr>
<tr>
<td>- Have students follow up with patient, as needed</td>
<td></td>
</tr>
<tr>
<td>- Have students build and maintain a reference tool to assist making appropriate OTC choices</td>
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<tr>
<td>- Add 1 product per week</td>
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<tr>
<td>- Require student to present that product to the staff</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient Counseling</th>
<th>Patient Counseling</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Set aside time for students to counsel patients</td>
<td></td>
</tr>
<tr>
<td>- Choose patients with a range of needs (who are likely to appreciate the interaction)</td>
<td></td>
</tr>
<tr>
<td>- Ensure a balance between counseling on prescription and OTC products</td>
<td></td>
</tr>
<tr>
<td>- New mothers are often an appreciative audience</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Community Education Seminars or Talks</th>
<th>Empathy Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Students benefit from public speaking</td>
<td></td>
</tr>
<tr>
<td>- Look for opportunities to use students to educate your constituents (e.g., community service groups, schools, church groups, nursing homes or assisted living complexes)</td>
<td></td>
</tr>
<tr>
<td>- Have students live as a patient with a chronic condition (follow the medication and lifestyle routine for several days)</td>
<td></td>
</tr>
<tr>
<td>- Have students use common durable medical equipment (oxygen tank, wheelchair or scooter chair, crutches)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pharmacy Management</th>
<th>Journal Club</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Talk regularly with students about management tasks and issues (e.g., sales and profits, staff management, scheduling, pricing of clinical services, laws and regulations)</td>
<td></td>
</tr>
<tr>
<td>- Help students see the literature as valuable</td>
<td></td>
</tr>
<tr>
<td>- Have students lead a review or analysis of a relevant article (every other week)</td>
<td></td>
</tr>
<tr>
<td>- Push articles at students regularly</td>
<td></td>
</tr>
</tbody>
</table>

OTC = over-the-counter.

Adapted from Thomas RA. Preceptor development: Integrating students into your pharmacy practice. 2006 Iowa Pharmacist Expo, Des Moines, January 28, 2006; and Hobson E, Roth M, Harris I. Active learning to achieve abilities. ACCP; October 22, 2005.
D. Organizing Instruction: Now that you have all these ideas for your classes and rotations, how do you start to implement them?

1. Syllabi for classes and rotations
   a. All courses and experiential rotations should have syllabi that clearly identify expectations for students, learning objectives, instruction and assessment methods, policies and guidelines, and other information. There are many good sources and templates to use for these, some of which are likely to be found at your school or college of pharmacy.
   b. A good syllabus answers student questions about the course or rotation, guides learning, and prevents inappropriate behavior, because expectations are clearly defined.

2. Lesson plans for individual learning modules
   a. Lesson plans are used by teachers and preceptors primarily to help organize and execute a learning activity (or set of learning activities), such as a lecture, skills lab session, or a day or week of a rotation. Lesson plans can also be shared with students to help guide their learning and promote transparency (and show what an organized teacher or preceptor you are!).
   b. There are many good sources and templates used for lesson plans. An example is shown in Figure 12.

Example Lesson Plan (for a somewhat traditional interactive lecture)

Learning goal for a 2-hour lecture on type 1 diabetes therapeutics for P3 students: By the end of this lecture, students will be able to select appropriate therapies for a person with type 1 diabetes.

Learning Objective 1: Identify therapies used to treat type 1 diabetes.

Learning Objective 2: Compare and contrast use of these therapies in patients.

Learning Objective 3: Given a patient case, select appropriate therapies to treat his or her type 1 diabetes.

<table>
<thead>
<tr>
<th>Time</th>
<th>Teacher Activities and Objectives They Achieve</th>
<th>Materials Needed</th>
<th>Student Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 minutes</td>
<td>Welcome, introduce topic, state learning objectives, and preview the 2-hour session</td>
<td>Lecture materials posted on course Web site for student access; a few paper handouts for those not wanting to use electronics In lecture theater with teacher laptop and projector with audio and video</td>
<td>Students seated at desks or tables with laptops or other method to take notes, and phones</td>
</tr>
<tr>
<td>5 minutes</td>
<td>Prompt student free write about type 1 therapies (Objective 1)</td>
<td>Prompt shown on big screen</td>
<td>In groups of 2–4, students list therapies for type 1 diabetes of which they are already aware</td>
</tr>
<tr>
<td>5 minutes</td>
<td>Prompt sharing of their lists (Objective 1)</td>
<td>Write or type their responses on laptop or overhead</td>
<td>Students raise hands and share 1 of their therapies</td>
</tr>
<tr>
<td>5 minutes</td>
<td>Show students your comprehensive list of therapies, ask how their lists are different (Objective 1)</td>
<td>List of therapies on slide on big screen</td>
<td>Students share how their lists are different, add to or subtract from their lists</td>
</tr>
</tbody>
</table>
### Figure 12. Example lesson plan.

<table>
<thead>
<tr>
<th>Time</th>
<th>Teacher Activities and Objectives They Achieve</th>
<th>Materials Needed</th>
<th>Student Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>39 minutes</td>
<td>Compare the basics of each of the therapies, asking students what they know about each one before divulging the information Could use free write or think-pair-share to do this (Objective 2)</td>
<td>Slides with information or pictures of each therapy</td>
<td>Students share their knowledge, take notes</td>
</tr>
<tr>
<td>1 minute</td>
<td>Prompt students for 1-minute paper</td>
<td>1-minute prompt on big screen</td>
<td>Students send questions electronically or write them on paper to give to instructor</td>
</tr>
<tr>
<td>10 minutes</td>
<td>Give students a break</td>
<td>Read through questions to determine those that are most common</td>
<td>Break</td>
</tr>
<tr>
<td>10 minutes</td>
<td>Respond to questions submitted before break (Objective 2)</td>
<td>List of questions to respond to</td>
<td>Students listen, take notes, chat, ask additional questions</td>
</tr>
<tr>
<td>10 minutes</td>
<td>Present simple patient case, ask students to recommend therapies or adjustments (Objective 3)</td>
<td>Case on slide and in handout</td>
<td>Students work in small groups to solve case</td>
</tr>
<tr>
<td>15 minutes</td>
<td>Ask for their recommendations, share yours (Objective 3)</td>
<td>Your answers to case and rationale</td>
<td>Students share, listen, add to or subtract from their notes</td>
</tr>
<tr>
<td>5 minutes</td>
<td>Summarize, ask for any final questions, announcement about more practice opportunities for them to solve cases to prepare for examination (Objective 3)</td>
<td>Post practice cases to Web site, post keys later</td>
<td>Students ask additional questions, make notes to work on practice cases</td>
</tr>
</tbody>
</table>

### VI. ADDITIONAL THOUGHTS ON ROLE MODELING AND MENTORING

Evidence supporting good precepting and some instructional techniques for experiential learning has already been shared. This section considers additional strategies for role modeling, mentoring, and coaching, which are the primary teaching models in experiential learning.

A. **Role Modeling**
   1. Professional socialization is the process whereby a person adopts the attitudes, values, beliefs, and behaviors held by a profession’s members. It has been noted that the most influential factor in this process is the role modeling that occurs by practitioners with trainees, both positive and negative.
   2. Role modeling is usually unintentional on the part of the preceptor. The process of mentees training and learning with mentors is similar to that of children learning from parents.
   3. Role modeling should be intentional, with preceptors practicing and interacting with others in a way they would want student pharmacists to emulate.
B. Mentoring  
1. As defined in the *Preceptor’s Handbook for Pharmacists*, mentoring is “helping others reach their full potential as professionals with the goal of developing practitioners who will pursue and attain excellence as patient care providers, teachers, scientists, managers, and/or leaders. Mentoring is a relationship based on the following:
   a. trust and respect,
   b. education and nurturing,
   c. inspiration to advance the practice of pharmacy and improve patient care,
   d. opportunities to grow and develop,
   e. metamorphosis as engaging in a process of self-reflection, self-assessment and self-transformation,
   f. professional guidance,
   g. nomination for awards when success has been achieved.”
2. Mentoring differs from precepting in that precepting is “teaching others the art and science of pharmacy practice in a health care setting with the goal of developing competent practitioners. Precepting involves
   a. a partnership for education,
   b. investment of time and energy,
   c. negotiation and individualization of learning activities,
   d. teamwork,
   e. coaching,
   f. evaluation of performance,
   g. professionalism role modeling,
   h. guidance.”
3. Some may consider mentoring as descriptive of a resident-pharmacist or intern-pharmacist relationship that is longer than just a few weeks. Precepting may be most descriptive of the student pharmacist–pharmacist relationship for IPPE and APPE.

C. Coaching  
1. Christine Nimmo describes coaching as a stage in the precepting model where the student pharmacist is allowed some independence in practice activities, with the preceptor providing feedback and support when needed.
2. Coaching differs from telling or showing the student pharmacist what to do in that the student pharmacist is allowed to try for himself or herself, usually in the presence of the preceptor.
3. This model strives for the student pharmacist to become independent after proper precepting and coaching.

VII. KNOWLEDGE AND SKILL ASSESSMENT TECHNIQUES

Several sections in this chapter have alluded to assessment strategies. This section provides greater detail about those and others.

A. Assessment Philosophies  
1. Assessment in education is often the driver for how students learn. Student learners will try to meet or exceed the expectations of the assessment, if those expectations are made clear. For example, if students know that their grades come from examination scores, then they will probably study and prepare to do well on examinations. Similarly, if students know that they cannot pass a clerkship rotation without exhibiting professional behavior, then they will probably try to exhibit professional behavior. Assessment techniques are powerful drivers for learning.
2. Ideally, assessments are designed after the learning goals, outcomes, and objectives, so that then instruction can be designed to help learners succeed on the assessments.
   a. The most important practice in designing assessments is that of instructional alignment.
   b. Even if the assessment does not necessarily match the learning outcomes and objectives, it should match how the learners learned the knowledge and skills being developed.

3. Formative versus summative assessment
   a. *Formative* refers to low-stakes assessments that are used primarily to give students feedback on their performance so that they can better achieve the learning outcomes and objectives. They are not used to give a grade or make a final judgment on students’ learning. Students often get to repeat formative assessments to achieve a higher level of success. An example of formative assessment is a midpoint evaluation of a student on an APPE where a grade is not given, but the evaluation is used to provide the student (and possibly the school) with feedback on the student’s performance thus far.
   b. Summative assessments usually have higher stakes and often serve as a final grade or capstone.

4. Assessment as learning
   a. This term is often used with *formative assessment* and implies that the students learn from being assessed through high-quality feedback.
   b. This strategy is commonly used with mastery and student-centered learning, as well as ability-based education.

5. Mastery versus norm-referenced assessment
   a. As mentioned previously, mastery learning implies that students master a subject or skill.
   b. Mastery is similar to competence-based grading, where students are measured against criteria deemed to define competence in any given area rather than being compared with each other.
   c. In norm-referenced grading, students’ performances are compared with their classmates’ performance, and judgments or grades are determined based on high and low performers. Grading on a curve is a type of norm-referenced grading. Bell-shaped curves are also used in norm-referenced grading.
   d. Mastery lends itself well to pass/no-pass grading, depending on where the pass line is set.

B. Designing Assessment Strategies
   1. Similar to instruction design, assessments should flow from the learning outcomes and objectives. For example, if an objective reads, “Compare and contrast potential antihypertensive therapies for a given patient,” then students could be asked to do this either orally or on a case-based essay examination.
   2. Consider the Bloom’s cognitive learning level of the outcome or objective. Is it knowledge based or something more applied at a higher level? The assessment technique should match the level. Multiple choice questions are much more difficult to write at the applied level. Most multiple choice questions are easiest to write for the knowledge level. Essay questions are better to measure progress toward achievement of higher-level learning outcomes.
   3. Also consider self-assessment, peer assessment, and 360-degree assessment.
      a. Students can develop better self-awareness (ACPE Standard 4.1) and have greater learning gains when they engage in self-assessment of their performance and their learning. For example, consider having your rotation students complete a self-evaluation of their performance using the same tool that you complete based on their performance, then discuss your evaluations. This could be very helpful during the midpoint evaluation.
      b. Similarly, students can gain double benefit when they engage in assessment of peers’ performances. They can learn how to objectively evaluate performance of a certain behavior, such as teamwork on a project, or on an individual SOAP note assignment, and learn from their peers’ feedback about their own performance.
c. 360-degree assessment refers to gathering multiple assessments from various sources that all observe and interact with the person being assessed. In medicine, for example, medical residents are evaluated by attending physicians, their peers, themselves, nursing and other ancillary health staff, and patients.

4. Specific assessment strategies
   a. Examinations
      i. Traditional: A few pencil-and-paper midterms and a final per quarter or semester
      ii. Group testing: Students take individual examinations first, then retake the same examination with a group, for a combination score. Research shows that most students’ scores improve when they take a group examination, with better retention of learning.
      iii. Computer-based: It is becoming more common for schools to use non-Internet databases with examination questions to examine students, with programs such as ExamSoft.
      iv. Oral: Although they are time- and labor-intensive, oral examinations are still preferred by some, especially to help prepare students for questioning that occurs during APPE and residency.
   v. Performance based: This technique refers to skill testing, such as for communication and physical assessment skills.
      (a) Many programs use standardized patients to help implement these types of examinations. Some are also known as objective structured clinical examination–type assessments (i.e., where students move from station to station performing different skills).
      (b) In performance-based assessment, as occurs during rotations, it is important that the criteria by which students will be judged are specific and objective and are made explicit. These characteristics can increase consistency between multiple evaluators or preceptors (interrater reliability).
   b. Other forms of assessment
      i. Papers: Good, old-fashioned research or term papers
      ii. Projects: Group or individual, on any number of topics
      iii. Presentations: Group or individual, of projects or papers
      iv. Interviews: Students complete interviews of various stakeholders, such as patients, providers, or payers, to learn, understand, and develop empathy.
      v. Reflective journaling: Often used to assess impact of service learning and other less quantifiable forms of learning.
      vi. Portfolios: Many programs have students maintain a portfolio of significant assessments, assignments, and evaluations that demonstrate progress toward and achievement of their competencies and ability-based outcomes.
      vii. Others: Many types of techniques are used to measure student learning. Keep in mind that the best assessments are aligned with learning objectives, and they also allow students to learn from them. Instructional strategies and assessment strategies can be one and the same. Consider most of the techniques listed above, along with studying using practice examinations, for example.
REFERENCES


ANSWERS AND EXPLANATIONS TO SELF-ASSESSMENT QUESTIONS

1. Answer: C
The other responses are false, as noted in Figure 1.

2. Answer: B
Instructional alignment exists when the learning objective, instruction, and assessment are identical or very similar. Ability-based education involves helping students develop abilities in addition to knowledge. Learner-centered teaching focuses on instructional design and assessment that will meet the needs of the learner, rather than focusing on the teacher and the knowledge to be delivered. Mastery learning involves teaching and assessing learners so that mastery or a certain level of competence is achieved, rather than comparing students’ achievements with each other.

3. Answer: D
The book’s definition of “helping others reach their full potential as professionals with the goal of developing practitioners who will pursue and attain excellence as patient care providers, teachers, scientists, managers, and/or leaders” is described in the context of teaching residents and other pharmacists-in-training, where the interaction goes beyond the few weeks of an APPE or IPPE rotation. This book and Nimmo’s also distinguish precepting, mentoring, and coaching in the context of developing pharmacists.

4. Answer: D
Multiple choice questions can also be written to measure analysis, application, or comprehension, but it is much more difficult. Higher levels of learning are usually assessed better by essay-type questions, oral examinations, papers, projects, and other types of assessments.

5. Answer D
See Figure 11. The other frameworks are more often used for didactic learning.

6. Answer: B
The other responses are not supported by the educational evidence provided in the chapter.

7. Answer: B
Although the other responses might be helpful, they may not be the best approach to prepare in this situation.

8. Answer: C
Experts describe the best feedback as specific, objective, constructive, and timely.

9. Answer: B
Although the other techniques may help develop critical thinking, the 1-minute preceptor has been shown in medicine to help improve medical students’ and residents’ critical thinking skills.

10. Answer: B
Any instructional design should always begin with the end in mind, determining what the instructor wants learners to have achieved as a result of his or her instruction. Lesson plans usually include learning outcomes, but creating those outcomes comes before completing the rest of the lesson plan. Designing active learning strategies and assessment questions is done after the learning outcomes have been created.

11. Answer: B
See Question 10. Although the other responses are important to consider, they are not the primary basis for test questions.

12. Answer: C
Although all the techniques mentioned might help develop those abilities, PBL is the one that explicitly can achieve those goals.

13. Answer: D
This gets back to the concept of instructional alignment, where the assessment should be identical or very similar to the learning outcomes and the instructional methods used.