3

Pre-assessment: Knowing Where Students Are as a Unit Begins

> The most important single factor influencing learning is what the student already knows. Ascertain this and teach him accordingly.
>
> —David Ausubel , *Educational Psychology: A Cognitive View*

A colleague shared a story about her unfortunate initiation to swimming. At her first swimming lesson, the swim coach asked the children to line up on the side of the pool in one of three groups. "If you don't yet know how to swim, line up here," he said, pointing to the shallow end of the pool. "If you know how to stay afloat but aren't yet comfortable with swimming strokes, line up here," he continued, as he pointed to a stripe near the center of the pool. "And if you are already a confident swimmer," he concluded, "line up here near the diving board." Our colleague's dad had told her repeatedly throughout her early years that she could do whatever she wanted to do in life. At that moment, she wanted to be a confident swimmer, so she joined the group of children near the diving board. When the coach asked that group to jump in the water and swim, she had a quick lesson in gravity, and the coach—dressed in slacks, a polo shirt, and running shoes—had to jump in the water to fish her out.

In retrospect, the story is humorous. It was not funny to the aspiring young swimmer at the time, however. The humor is also lost on many students in many classrooms many times a year who find themselves sinking beneath curriculum that is, at that moment, too deep for their current skills, and on students who are ready to swim competitively and who are asked to stand in the shallow end of the pool while less experienced classmates learn to put their faces in the water.

A teacher who consistently and effectively uses pre-assessment makes an implicit statement that she has no intention of "delivering curriculum" without understanding the entry points her varied learners will bring to the content she will commend to them.

Pre-assessment helps the teacher locate the "area of the pool" appropriate for each student as a unit of study is about to begin.

Informal pre-assessment of students can take at least two paths. One occurs as a teacher observes or talks with students at the outset of a school year and in the weeks and months that follow in ways that inform how she will shape and differentiate a unit. For example, a 3rd grade teacher who learns that she has seven students with a keen interest in dogs may offer the option of interviewing a veterinarian or a person who shows dogs when students conduct interviews as a basis for biographical writing they will do. As a social studies unit begins, a middle school teacher may conduct a somewhat more formal, but still indirect, pre-assessment of student comfort with a topic by asking students to use hand signals to rate themselves a one, two, or three in their comfort with using latitude and longitude to locate places. Both approaches give the teacher information that is potentially useful in planning for instruction, but neither is likely to provide information that is as systematic or available for study and review as more formal approaches to pre-assessment in which a teacher elicits or examines student work. For the specific purpose of identifying students' entry points, this sort of informal or indirect pre-assessment should be part of the fabric of differentiation—a teacher continually on the lookout for information that not only will provide some guidance for planning upcoming units of study, but also will help the teacher understand, connect with, and engender trust from students. Informal or indirect pre-assessment is less common than indirect or informal ongoing assessment, which we address more fully in Chapter 4.

In this chapter we examine more formal or direct pre-assessments of student readiness, interests, and learning profiles by providing explanations and examples for each category. We also explore the important question of how to make sense of and use pre-assessment information for instructional planning.

Back to the KUDs

At the outset of a discussion on planning pre-assessments, it's difficult to overemphasize the importance of teacher clarity about what students should know, understand, and be able to do as the result of a unit of study. Although it's not the goal of a pre-assessment to probe every piece of knowledge, understanding, and skill designated for an upcoming unit of study (or every relevant instance of prerequisite knowledge, understanding, and skill), it does matter to sample what's most pivotal in the unit. Therefore, before beginning to develop a pre-assessment, a teacher needs to be clear on, for example, critical vocabulary in the unit (an example of knowledge, or the *K* in *KUD*); foundational insights or understandings (the *U*) about the meaning or significance of the unit; and content skills that are at the core of what students will learn to do in the unit (the *D*). Skills should include not only basic skills, but also critical-thinking skills (such as

application, comparison and contrast, supporting an argument, looking at events and issues from multiple perspectives, empathizing, noting flaws in reasoning, making connections across instances), and skills of a discipline (use of primary historical sources, scientific thinking, effective use of figurative language, mathematical reasoning, preparing a piece of art for exhibit). Content standards may provide direction in all or some of these areas. However, a set of standards is not, and should not be thought of as, a curriculum. Rather, standards are ingredients for curriculum. Dynamic curriculum requires a teacher who knows the content well enough to blend required ingredients (standards) with the nature and intent of the discipline in a way that represents both appropriately and that also helps learners relate to, organize, and make sense of the discipline's "narrative." In other words, the teacher has to know the "story" the unit is about to reveal for students well enough to have a good sense of what to sample in order to determine a student's point of entry.

Thinking Flexibly

It's useful to think about pre-assessment as a flexible process for extending a teacher's understanding of student learning needs rather than a fixed prescription or algorithm. Thinking about it in this way supports the need for insight to guide the use of pre-assessment. For example, what to pre-assess, how much to pre-assess, and when to pre-assess may vary with student background and unit requirements.

At times a teacher may only want to assess a student's entry point related to the unit's knowledge (*Ks*), or see how a student employs particular skills (*Ds*), or see what a student makes of a big idea or principle that will guide the study ahead (*U*). Most of the time, however, it makes sense to tap all three because they are all important in understanding students' varied starting points with the content of the unit and in planning comprehensively to ensure that instruction matches learners' needs. In brief, the first question a teacher should ask when composing a pre-assessment is "What *Ks*, what *Us*, and what *Ds* am I trying to measure here?"

There may also be times when a teacher wants to pre-assess for only a portion of an upcoming unit of study. For example, an algebra teacher wanted to pre-assess only the initial concept of a complex unit on quadratic equations in which she felt student understanding would be cumulative. Therefore, she decided to pre-assess the content for approximately the first week of a four-week unit, with another pre-assessment to follow for the remainder of the unit.

In addition, sometimes a pre-assessment is best administered soon after, rather than before, a unit begins. For instance, a group of kindergarten teachers felt confident that their students were highly unlikely to know much about symmetry and asymmetry before they introduced the concept. On the other hand, they also felt that some students

might grasp the fundamental idea of symmetry quickly once they encountered it, while others might require additional time to understand and apply it. The teachers, therefore, agreed to do one lesson on symmetry and asymmetry in which they explained the terms and illustrated them with common objects. Over the next day or two, while students worked with other content, the teachers pre-assessed each student's understanding of the two concepts by giving each of them a bag with paper figures in it. Students drew three figures from the bag, explaining whether they thought each illustrated symmetry or asymmetry, and elaborating on why they selected their answer. The pre-assessment was much more revealing than it would have been had the teachers not introduced the concepts before the pre-assessment. As they listened to student responses and explanations, it became clear to the teachers that some students lacked foundational (prerequisite) vocabulary to move ahead with the ideas successfully and that other students' extensive vocabularies enabled them to deal with the concepts more rapidly than the teachers had assumed. The results of the pre-assessment guided teacher planning for students along a continuum of readiness to learn about and apply the concepts of symmetry and asymmetry.

Pre-assessing Student Readiness

Pre-assessment of student readiness has two functions. One is to provide the teacher with clarity regarding students' prior or prerequisite knowledge related to content that the upcoming learning segment is going to build upon. Assessing for prior knowledge can identify student misconceptions as well as gaps in knowledge and skills that a teacher might assume students of a particular grade level have already mastered. Although misconceptions and gaps can occur for various reasons (for example, incorrect prior instruction, the student's past experiences, forgetting), addressing them through targeted instruction is important because evidence suggests that students assimilate new content into their existing content schema (Tomlinson & Moon, 2013). If new content is taught without first identifying and then undoing misconceptions or identifying gaps in students' knowledge, understanding, or skill, misconceptions persist and gaps become gulches. Both inevitably interfere with intended learning.

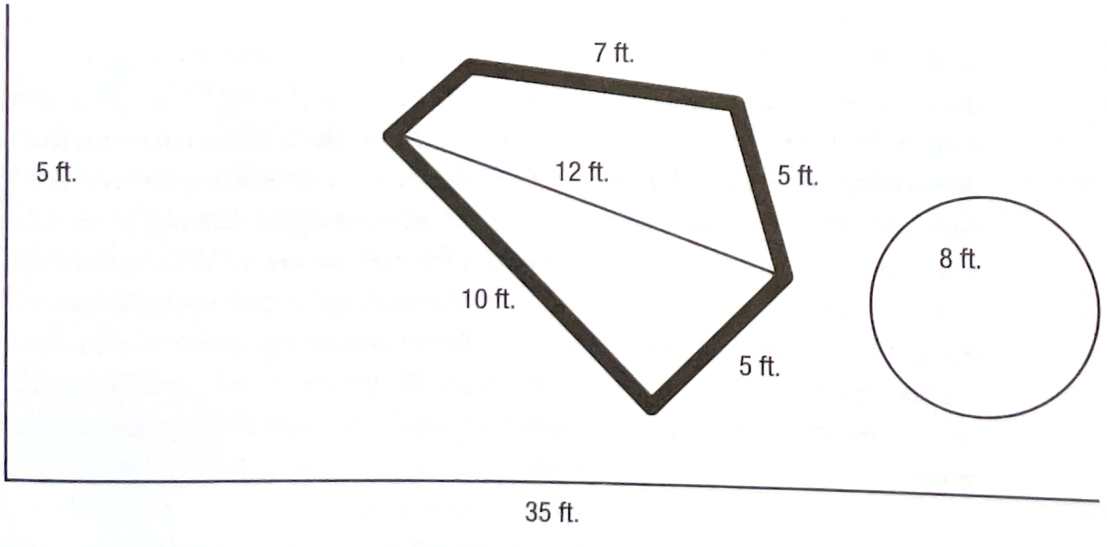
The second role of pre-assessment of student readiness is to provide information for the teacher regarding students' levels of mastery of the unit's new content so that instruction can be appropriately targeted to their varied proficiencies with that content. It is important to not assume that students are blank slates or that because the content has not been directly taught (or because *we* haven't taught it to them) that students do not already have some level of mastery of the new content. To spend time reteaching concepts or skills that some students have already mastered is a waste of instructional time, just as it is a waste of time to forge ahead with new content for other students who

enter the topic with critical misconceptions or significant gaps in knowledge or skill. Both cases result in little or no academic progress.

In addition to understanding the role a particular pre-assessment would best play for a given unit, teachers can use the following five quality indicators for pre-assessments as a guide.

Indicator 1: The pre-assessment targets the most important KUDs for students to develop and are aligned with current KUDs for beginning the planning of the instructional sequence. Here is a typical standard for a 3rd grade geometry unit: *Students choose and use appropriate units and measurement tools to determine the perimeter of a polygon with integer sides.* To pre-assess this standard, a teacher might give students a polygon figure with the length provided for each side. Their job would be to determine the perimeter of the polygon, and to both show and explain their work. In the example in Figure 3.1, students are not asked to define perimeter specifically, but rather to apply their knowledge of perimeter to solve the problem. The circle and the frame are distracters (because they are not polygons) that are added to identify any students who may not understand the concepts of polygon and perimeter. The directions also elicit procedural understanding about how to compute the answer. The question targets student knowledge (*K*) of vocabulary (including *polygon* and *perimeter*), their understanding (*U*) of how those concepts work, and their skill (*D*) in both computing perimeter and explaining their thinking process in doing so.

Figure 3.1
A Pre-assessment Designed to Show Students' Readiness



What is the perimeter of the polygon? Show and explain your work

Indicator 2: The pre-assessment uses a method that is appropriate for collecting the information the teacher is seeking to gather. If the goal of instruction is for students to develop an understanding of the scientific-inquiry process, one appropriate way to measure current levels of understanding would be to ask students to create a concept map that demonstrates the relationships among the process's different components and subcomponents that are provided in a list on the pre-assessment. If, however, the goal is to simply gather data regarding students' current knowledge of dates and places of Civil War battles, then the most appropriate pre-assessment method would be to ask students to indicate specific dates and places for certain battles—facts that could be gathered on entrance or exit cards or in paper-and-pencil quiz format. To the degree that teachers intend to teach for understanding, application, and transfer, pre-assessments (as well as formative and summative assessments) need to ask students to show evidence of those skills rather than only calling for knowledge-level responses.

Indicator 3: The pre-assessment recognizes time constraints. It's not necessary for pre-assessments to be lengthy in order to reveal what the teacher needs to know about students' current status with KUDs and pre-requisite KUDs. Often one or two well-designed questions or prompts are adequate. When a longer pre-assessment seems useful, questions can be given over the course of several days, a few at a time. In this way, the pre-assessment does not use a significant portion of instructional time in any one class period.

For example, Ms. Welsh, a physical science teacher, knows that during the second nine-week period, the unit focus will be classification of matter. As part of this unit of study, the class will explore topics such as physical and chemical properties, atoms and elements, and the periodic table. Ms. Welsh wants to understand where her students are relative to the concepts of physical and chemical change so that she can prepare to address her students' inevitable varying readiness levels. She decides that she will begin the pre-assessment process two weeks in advance and that she will use entrance tickets as the format. As students enter the classroom, they know to follow directions written on the board. They use index cards that are in a box by the door to answer the following question: "Define the three common states of matter and give examples for each one. If you are not sure about the common states of matter, just say so." This entrance ticket serves as an anchor activity before starting the day's instruction so that students are engaged in a meaningful task that will provide pre-assessment information Ms. Welsh can use in planning the upcoming unit of study. The pre-assessment is sufficiently brief that it doesn't take a significant amount of time from the day's instruction. She will repeat the entrance-ticket procedure with other questions focused on the upcoming unit's KUDs and prerequisites over the next several days.

A second way of thinking about pre-assessments and time constraints has to do with teachers' time for planning to use what they learn from the pre-assessment. Sometimes

it's feasible to administer a pre-assessment on Tuesday, for example, and then to review students' work and use findings to plan for Wednesday's class. It's more likely, however, that the teacher needs more than one evening to review students' pre-assessment responses, digest what those responses reveal, and make sound instructional plans that incorporate those responses. For that reason, it's often wise to administer a pre-assessment a few days before the start of the new unit of study in order to deal with the constraints on the teacher's own time.

Indicator 4: Pre-assessment items should be ordered or arranged in a way that requires a minimum amount of time for the teacher to make sense of exactly where students are relative to the KUDs being assessed. Pre-assessment items can be arranged in several different ways to make it efficient for a teacher to make sense of students' entry points with the KUDs. One approach is for the teacher to "chunk" questions by topic so that those measuring common constructs are grouped together. For example, a teacher might develop a paper-and-pencil pre-assessment for an upcoming unit on force, motion, and energy. The first few items would focus on characteristics and interactions of moving objects (direction, speed, friction), and the next set of items would center on types of circuits (open/closed; parallel/series) and their functions. By grouping items related to similar content, the teacher minimizes the amount of time needed to get a snapshot of a student's degree of familiarity with each segment of content.

Arranging questions sequentially is a second way to maximize teacher efficiency in learning from student pre-assessments. This approach is particularly useful when attempting to assess student facility with a process, such as the writing process or the process of designing an experiment in science. For example, the writing process is often taught as a series of sequential steps that include brainstorming ideas, prewriting, writing, editing, and publishing. At the beginning of the year, a teacher might pre-assess students' understanding of the writing process by inviting them to write her a letter in their writing journals describing how they go about creating a poem or a story or an essay. Through this pre-assessment the teacher would gain information about students' understanding of the writing process and the structure of letters. In addition, she would gain some insight into the students as people—their interests, experiences, dreams, and so on—a vitally important aspect of studying and learning about learners.

A third way to arrange pre-assessment questions to facilitate efficiency of teacher review is hierarchical—moving from less complex concepts to more complex ones (see the example in Figure 3.2). Notice in the figure that the hierarchy of items includes prerequisite skills, skills projected for the upcoming unit, and skills that extend beyond the unit's skills in order to determine whether some students are entering the unit with skills that are significantly advanced. It takes only a short time to consider purposeful arrangement of questions on a pre-assessment.

Figure 3.2
A Hierarchical Pre-assessment in Math

Problem	Learning Goals
18 -11	Subtract two 2-digit numbers when the number is less than or equal to 20. (Necessary Prior Concept)
45 -23	Subtract two 2-digit and two 3-digit numbers when regrouping is not required. (Upcoming Unit Concept)
423 -222	Subtract two 2-digit and two 3-digit numbers when regrouping is not required. (Upcoming Unit Concept)
642 -430	Subtract two 2-digit and two 3-digit numbers when regrouping is not required. (Upcoming Unit Concept)
21 -17	Subtract 2-digit numbers with regrouping from tens' place. (Upcoming Unit Concept)
46 -37	Subtract 2-digit numbers with regrouping from tens' place. (Upcoming Unit Concept)
633 -327	Subtract 3-digit numbers requiring regrouping from either tens' or hundreds' place. (Horizon Concept)
552 -261	Subtract 3-digit numbers requiring regrouping from either tens' or hundreds' place (Horizon Concept)

When a particular arrangement reflects the content's logic, using such an arrangement can save considerable time as the teacher makes sense of pre-assessment results.

Indicator 5: The information gathered from the pre-assessment is used for the sole purpose of guiding instruction and is not used for grading or judging students. It's essential for students and teacher alike to be clear that pre-assessments are not used for grading students or for judging or categorizing them in any way. Fundamentally, grades are indicators of student proficiency after an amount of instruction and practice sufficient to suggest that mastery is a reasonable expectation. Pre-assessments are administered before either of those conditions is met and are therefore inappropriate for grading. Further, it's important to recall the interconnectedness between the five classroom elements discussed in Chapter 1. It is difficult, if not impossible, to create a classroom environment that feels safe and serves as a catalyst for learning if it is replete with judgments. Students who struggle with some aspects of a class need to be freed from the sense that each new cycle of learning reinforces their weaknesses. Those students need repeated

experience with the message that learning is progressive and virtually always includes making mistakes that are important in helping students and the teacher figure out how to proceed in a clearer and more meaningful way. Students who may be advanced in much of a subject may well have come to value grades above learning itself. When presented with an appropriate challenge, such students may reject the stretch if they feel the risk will be punished with a poor grade if the product is not "perfect." Those students, too, need to understand the inevitability of errors and their instructive potential. For students to develop a growth mindset and to invest seriously in their own growth, they need to have ample proof that the teacher in a differentiated classroom asks for their consistent best effort, that pre- (and ongoing) assessments enable the teacher to teach them more effectively and enable them to contribute to their own success. They need to know that although there is a time in the classroom for summative demonstrations of their development, those come after multiple cycles of instruction, practice, feedback, and correction. A kindergarten teacher routinely reminded her students at the start of any pre-assessment, "I'm asking you these questions just so I can see what you already know and what I need to teach you so you can learn it. That makes me a better teacher and will help you be a better learner." That message is no less necessary for high school students—or students of any age.

Formats for Pre-assessments

Pre-assessment strategies can be indirect (informal) or direct (formal) measures. Indirect or informal strategies are typically unstructured in that specific instructional time is not devoted to systematically gathering the data for every student. Rather, the teacher conducts classroom "sweeps" or "samples." Examples of this type of pre-assessment strategy include, among others, windshield checks, thumbs-up/thumbs-down, KWL charts, and classroom-response systems (often referred to as "clickers"). Most strategies that are useful for pre-assessment are also useful for ongoing assessment. (See Figure 3.3 for descriptions of some indirect or informal pre-assessment strategies.)

One type of indirect or informal measure is students' self-reporting of where they believe they are relative to designated knowledge, understanding, or skill. The advantage of this approach is that it allows students to build self-reflection skills and it can be done quickly and with minimal intrusion on instruction. The major disadvantage is that the data are generally at the class rather than the individual level, making it difficult to get an accurate reading of the status of individual students. Further, students' self-evaluation may not be precise.

A second kind of informal or indirect pre-assessment is teacher observation of students. Very good teachers are also often very good student-watchers. As Mr. Arnold watched his kindergartners work with calendar math over the last couple of weeks, he

Figure 3.3
Indirect or Informal Strategies for Pre-assessment

Hand Signals—The teacher requests that students self-assess their own proficiency with knowledge, skill, or understanding in a particular area by holding up one finger if they're not yet comfortable with it, two fingers if they are mostly comfortable with it but still need to learn or practice more, three fingers if they feel very confident and could teach others about it. An alternative is to show a thumbs-up to indicate strong confidence, a thumbs-sideways to indicate reasonable confidence, and a thumbs-down to indicate that they are not yet comfortable or confident in the area.

KWL Charts and Other Organizers (Class Level)—The teacher conducts a discussion with the whole class on a topic about to be studied by having students contribute to a graphic organizer such as a KWL chart, in which students list what they already know about the topic (*K*), what they want to know (*W*), and, toward the end of the unit, what they learned (*L*). As the teacher hears K and W responses, she gets a general picture of student familiarity with the topic but not clarity about the status of each individual student. Other organizers such as concept maps or Venn diagrams are also useful.

Response Cards—The teacher poses a right-answer question to which students respond by holding up an index card with a preprepared response option on it. Each student might have three cards (such as *a*, *b*, and *c*) to select from, or two (such as *yes* and *no*). As students hold up their cards, the teacher quickly checks what proportion of the students have the correct response.

Informal Conversations and Observations—As teachers talk with students informally through the school day or formally as students work on tasks or in class discussions, and as they observe students informally while the students work, they become aware of particular students' interests, ways of working that seem to benefit some students or hamper others, topics or skills in which some students are quite advanced, or areas of deficiency for some students. This information can and should inform planning for upcoming units of study.

noticed several of them beginning to add the numbers on the calendar—including even some two-digit numbers. He began making a list of students who were venturing into addition so that he could follow up on their natural interest in addition in an upcoming unit on number concepts and operations. Ms. Lazen encourages her 5th graders to write daily about something important or interesting to them. As they write, she often sits and chats with them about their ideas and the ways they express them. She jots down on sticky notes things that seem useful and then puts the sticky notes on student pages in a writing notebook she refers to often as she plans upcoming units or lessons and as she talks with students or parents about students' growth as writers.

In both instances, the teachers' observations are purposeful and the teachers often use what they observe as part of their pre-assessment information. In neither case, however, does the teacher systematically gather the information on all students in a way that provides a complete class profile of relevant information for planning an upcoming unit.

Although both types of indirect or informal assessments—student self-reporting and teacher observation—can be used in pre-assessing student status and needs, they are better suited and more often used for ongoing assessment or formative assessment. We describe some additional strategies that are appropriate for ongoing assessment in Chapter 4.

Direct or formal strategies for pre-assessment of student readiness are structured moments when instructional time is given up for the sole purpose of gathering data at the individual student level across the entire class. Examples include paper-and-pencil pretests, preplanned and structured observations or interviews (such as think-alouds) with each student, graphic organizers/concept maps, problem sets, and journal entries, to name a few. Note again that most strategies that are useful for pre-assessment are also useful for formative or ongoing assessment. (See Figure 3.4 for descriptions of some direct or formal strategies for pre-assessment.) The key difference between indirect (informal) and direct (formal) pre-assessment strategies stems not so much from how teachers use resulting information to plan instruction as in the way instructional time is affected and the level at which information is obtained (sweep of a class versus each individual student).

Figure 3.4
Direct or Formal Strategies for Pre-assessment

Frayer Diagrams—A rectangle is divided into four equal sections, with an oval or an additional rectangle in the center. In the center figure, the teacher writes a concept or topic for an upcoming unit and asks students to share their current knowledge in the four quadrants, which are typically labeled "Definition or Explanation," "Information You Know," "Examples," and "Nonexamples." A nonexample is something related to the topic or concept, but not quite the same thing. For example, a whole number, a decimal, and a percentage are nonexamples for the concept of fraction. They are related, but not really fractions.

Systematic Observations/Interviews—The teacher has individual conversations with students or observes them systematically as they work or present work. The teacher records relevant information about each student on predesigned checklists or guides.

Journal Entries/Writing Prompts—The teacher poses a thought question central to a topic and students respond in writing.

Show and Tell—The teacher poses a question, and students both show (illustrate) and explain what they know about it. This approach is especially helpful in determining understanding for students who may be learning the language of the classroom or who have difficulty with written expression for a variety of other reasons, but who know something about the topic or skill at hand.

Student Self-Rating—The teacher provides students with a list of topics, concepts, or skills for an upcoming unit and asks them to rate their proficiency—for example, from 1 to 5, with 5 indicating that they are quite skilled or comfortable with it and 1 indicating they've not yet developed comfort or proficiency with the topic. For example, a world language teacher asked first-year students as the course began to rate their proficiency with subjects, predicates, direct objects, indirect objects, prepositions, and phrases in English or another language that is their first language.

Quizzes—The teacher administers and reviews a short answer or open response quiz designed to reflect the upcoming unit's KUDs and important prerequisite knowledge.

Interest Surveys—The teacher asks students to select from or rank options according to their interests, to list/draw and elaborate on their interests, or indicate certain approaches to learning they find to be particularly effective or ineffective for them as individuals.

Making Sense of Results

One of the most commonly asked questions regarding pre-assessment is "What do I do with the results?" The "now what" question isn't difficult to answer, but, as with many things in life, the answer isn't always evident at first.

The goal of pre-assessing is to understand where each student is at the moment with the upcoming unit's KUDs. Understanding what pre-assessment data can reveal about students' levels of competence with the KUDs or with prior knowledge requires the teacher to be a critical analyst. In other words, examining what each student has done on the pre-assessment relative to the KUDs helps teachers make informed, professional judgments about the degree to which meaningful differences exist among students. Meaningful differences are those that will affect the teaching-learning process. They are differences that suggest a one-size-fits-all approach is likely to miss some or many, if not all, students. Some students may lack prerequisite knowledge, understanding, or skill that is absolutely necessary for the work ahead. For example, understanding fractions is a crucial ingredient for early study in algebra. If students lack a solid understanding of properties of numbers and operations, the pursuit of the more complex concepts and operations in algebra simply will not be successful.

In other instances, some students may have misconceptions regarding KUDs that are the focus of study. For example, many students have the misconception that all rivers flow southward. This misconception may be a result of the way maps are oriented, or a confusion stemming from the idea that "up" is always north and "down" is south—another potential miscue from map orientation. Although many rivers do flow southward, the way in which rivers flow is simply a result of movement toward lower elevation. Lacking this understanding can cause confusion in working with maps, in social studies, in geography, and in some aspects of science.

Analysis of pre-assessment responses of still other students may indicate that they already have a sound understanding of content that the teacher is preparing to introduce. In other instances, the data may indicate that students have already mastered the necessary prerequisites as well as the new learning that is about to be addressed. For example, a pre-assessment for a mythology unit in middle school reveals that four students not only are familiar with many gods and goddesses in Greek and Roman mythology, but also can note parallel stories in myths from other civilizations. In addition, these students understand that myths mirror the culture of the people who told them. These students do not need to spend three or four weeks "relearning" what they already understand in some depth. Rather, the teacher might plan, for example, to guide them in comparing and contrasting myths across times and cultures and to unpack the nature of the cultures by making inferences from myths central to their development.

In the real world of the classroom, it's likely also, of course, that some students will demonstrate advanced development with the unit's *K*s but be unable to explain how the

information makes sense or demonstrate sophisticated insights about the unit's understandings (*Us*); they may also lack some fundamental skills (*Ds*). In these instances, a student may need additional instruction or practice with some aspects of the unit's content and more complex work than many peers with other aspects.

As teachers see patterns in the pre-assessment data, they make the critical move from administration of a pre-assessment to using the results for instructional planning. Making sense of the data begins with a simple sorting exercise—sorting student responses' into different stacks based on *meaningful differences* related to the KUDs. Patterns that emerge will vary with the assessment, the topic, and the students involved. In some cases, a teacher may conclude that as the unit begins, students fall into four clusters, based on readiness: (1) students who can both define and explain an idea, (2) students who can define but not explain the idea, (3) students who can explain the idea but without use of clear academic vocabulary (explain but not define), and (4) students who can do neither. In other cases, the pattern may be simply this: (1) students who begin the unit with a foundational grasp of important knowledge or skills and (2) students who begin the unit without such knowledge or skills. In still other instances, the pattern may just be (1) students who have necessary prerequisite knowledge and (2) students who do not.

For many teachers, instruction proceeds routinely with the implicit assumption that the same first steps in teaching and learning are correct for the entry points of all learners in the class. In fact, that assumption is rarely appropriate, and in a differentiated classroom the teacher doesn't make that assumption. Instead, the teacher examines pre-assessment responses for patterns of strengths and needs related to KUDs that suggest teaching and learning sequences that would benefit some, many, or all learners as a unit of study gets underway.

Pre-assessing for Student Interests and Learning Profiles

In addition to gathering information regarding students' readiness to learn new content, pre-assessments can also reveal students' interests and can shed light on their learning profiles or learning preferences. Understanding students' interests allows teachers to make content relevant for students in order to increase engagement in learning. Understanding the students' learning preferences helps teachers consider a range of ways in which students can take in, make sense of, and demonstrate proficiency with important content so that the learning process is as efficient for students as possible. Attending to both student interests and learning profiles can help maximize learning opportunities for a broad range of students.

Pre-assessing for Interests

Two interpretations of "student interest" can be helpful in shaping instruction to be a better fit for more students. First, interest can relate to pursuits students enjoy on their own time—in other words, things like music, basketball, collecting coins, community service, archeology, gaming, and so on. Skilled and willing teachers can find many connections between the content area they teach and student interests. Math, for example, easily connects to gaming, music, a variety of collections, building, the stock market, and even poetry. The themes of literature are evident in history, current events, art, and music—and in the school lunchroom. Science is easily located in politics, community action, literature, and world cultures, to name just a few possibilities. Teachers who talk with students about their own interests, listen for clues about students' passions, and directly survey (or pre-assess) student interests are well positioned to make links with students' interests in ways that greatly enhance content relevance, student motivation, and achievement. For example, students in an Algebra I class who worked with algebra problems personalized to address an area of interest performed better—particularly in more complex and abstract aspects of the content—than students who did not work with personalized problems (Walkington, cited in Sparks, 2012). Figure 3.5 provides an example of a high school pre-assessment of students' personal interests.

It's also possible to think of students' interests in a narrower but still useful way. By having students rank subtopics in a unit, topics in a yearlong study, or some other range of items required in a curriculum, a teacher gets a sense of which facets of study are more likely to be inviting to some students and less interesting or even aversive to others. With that information, the teacher can form expert groups with students who are drawn to a given aspect of a subject, enable excited students to share ideas with more reluctant ones, pay special attention to students whom the teacher knows are reserved about a topic, or connect a student's personal interest with a required topic in which that student is less interested. Figure 3.6 provides an example of this perspective on student interests. The teacher asked students to indicate which required genre they were already fans of, which seemed OK to them, and which ones they had negative feelings about. Student responses enabled her to pay extra attention to students working in a genre they didn't yet care for, to have students who favored a particular genre share their enthusiasm for that kind of writing, and to combine genres to address student interests as well as their reservations. For example, two students indicated a preference for animal stories and a distaste for mysteries. Working with the librarian, the teacher was able to find mysteries that involved animals and to add those books to the classroom library. Similarly, three students who didn't like fantasy enjoyed comedy. The librarian located fantasy books that included humor to add to the collection.

Figure 3.5
A Pre-assessment of Student Interests from a High School Biology Class

Directions: I'll be a better teacher for you if I understand some of your interests. In each box below, write an interest of yours. Write briefly about how you are involved with that interest. Note also any ways you can think of that the interest might connect with science.

Interest: Experience with it: Connection with science:	Interest: Experience with it: Connection with science:
Interest: Experience with it: Connection with science:	Interest: Experience with it: Connection with science:

Figure 3.6
A Pre-assessment of 2nd–3rd Graders' Interests Related to Genre

Genre Survey

Directions:

- Please put a star next to the genre that's most exciting for you. ★
- Please put a smiley face next to genres you think are OK. ☺
- Please put a down arrow next to genres you think are yucky. ↓

1. Historical fiction
2. Fantasy
3. Mystery
4. Comedy
5. Fiction about 2nd and 3rd graders
6. Outdoor adventure
7. Animal stories
8. Science fiction

Both approaches to understanding students' interests and connecting them with important content enhance student motivation to learn and therefore likely increase academic outcomes as well. Attending to student interest also clearly signals teachers' investment in their students.

Pre-assessing for Learning Profiles

Assessment of students' learning profiles, or preferred approaches to learning, merits caution. Despite ample evidence that individuals often approach the same task in different ways, experts in several disciplines are critical of how teachers assess and use the resulting information to address learning styles in classrooms. A number of experts (e.g., Coffield et al., 2004; Pashler et al., 2008) in psychology criticize the lack of clear definition of concepts such as "learning style" (in which they often and mistakenly include "intelligence preference") and admonish that the many different models of learning style and their varied emphases make the concept useless. Further, they are critical of educators' use of learning-style (and intelligence-preference) surveys to determine student strengths and weaknesses in this area because those instruments generally lack reliability and validity (Eliot, 2009; Salomone, 2003; Tannen, 1990; Storti, 1999; Trumbull, Rothstein-Fish, Greenfield, & Quiroz, 2001). Finally, psychologists stress that all individuals learn in a variety of ways, and that preferred approaches vary with time and context. Thus, they caution, labeling a student as being a particular kind of learner is not only unfounded but also restrictive. A number of neuroscientists are critical of the idea that individuals learn math, for example, by writing songs—a criticism of one popular use of Howard Gardner's multiple intelligence theory. Some sociologists condemn categorizing students as types of learners, pointing out that such categories often result in stereotyping and reminding us that labeling people is almost never without cost (Coffield et al., 2004; Pashler et al., 2008). At the same time, some neuroscientists (e.g., Willis, 2006, 2007) make the case that learning is both more natural and more durable when individuals take in and explore information through multiple modes and when students have opportunities to work in a variety of ways. Further, there is general agreement that gender and culture do shape an individual's approach to learning, but with the persistent caution that not all individuals from a given culture or gender will learn in the same way.

Best practice related to assessment of learning profiles and use of the resulting information likely includes the following do's and don'ts:

- Don't use instruments that lack evidence of validity and reliability to assess an individual's learning style or intelligence preferences.
- Don't categorize or label students as being a particular kind or category of learner.

- Don't always teach in the ways that are most comfortable for *you*.
- Do study your students to see what helps them succeed and what hinders their success. Take anecdotal notes on choices students make when they have learning options. Ask them to tell you which teaching and learning approaches in your class are most effective in helping them learn. Talk with parents to benefit from their insights about how their students seem to learn best.
- Do present content through multiple modes.
- Do provide opportunities for students to make sense of ideas and skills and to demonstrate what they've learned in varied ways.
- Do help students understand that they can learn in a variety of ways and help them develop awareness of when an approach is working in their favor, when it's not, and how to change approaches when warranted.

Effective differentiated instruction includes flexible grouping of students, consistent use of varied pathways to accomplish important goals, varied approaches to teaching, varied use of media to support learning, multiple options for expressing ideas and demonstrating learning, flexible use of time and resources, and so on. Those things can all be accomplished without using dubious assessment tools and without labeling students.

Using Assessment Information to Plan Instruction

As noted in our earlier discussion about student readiness, our best current knowledge of the learning process points to the reality that student readiness to learn particular content at a particular time is a central factor in academic growth. In other words, to help students make the kind of academic progress they need and deserve, it's essential for a teacher to understand and address student readiness needs. That does not suggest that every element in every lesson has to be a perfect match for every student, but it does mean teachers need to understand and be ready to address general sequences of learning, know where students are at a given time, and be ready to help students move ahead from their starting points.

The roles of interest and learning profile in student success are both similar to and different from the role of readiness. Differentiating instruction based on student interest and learning profile contributes to two important attributes: motivation to learn and efficiency of learning. Some students find "schoolhouse learning" worthwhile only when they are able to connect it to their own experiences or backgrounds or affinities. Some students understand academic content first or best when they can relate it to personal interests. For some students, having the opportunity to move around or work with peers or draw before they write opens a gate to academic engagement. For these students, the role of interest-based or learning profile–based differentiation is pivotal—in many

ways not only as important as readiness-based differentiation but tightly intertwined with it. For other students, opportunity to connect learning with interests or to learn in a particular way is an enhancement to readiness-based differentiation. In either case, what teachers can learn about their students' interests and approaches to learning opens the way to designing classroom experiences that meet students where they are in order to move them forward.

Understanding that a group of students in a math class are fans of a particular kind of music, for example, might lead a teacher to have students compare the rhythms in that type of music with a contrasting type, using fractions to express the rhythms. In fact, a research study (Courey, Balogh, Siker, & Paik, 2012) found higher test scores in the area of fractions for 3rd grade students from a multicultural and mixed socioeconomic public school who worked with a hands-on music curriculum in lieu of some in-class mathematics instruction. Students in the music group studied music notation, fraction symbols, and fraction equivalence in relation to music twice a week for six weeks. Their performance with both fraction concepts and fraction computation was significantly better, with high effect sizes, than that of students who only had math instruction in fractions.

Knowing that the class contains students from several different cultures might help an English teacher select readings from those cultures to use in conjunction with *Romeo and Juliet*, a required reading in her class. Observing that some students in a class are reticent to participate in whole-class discussions might encourage a teacher to use think-pair-share as an entrée to a class discussion.

Rarely would a teacher conduct pre-assessments of interests and learning profiles at the outset of every unit. Rather, the teacher might collect formal data on these two areas once or twice a semester, build on that formal collection of information with careful conversation and observation throughout the year, and seek feedback from students periodically on what works well in the classroom for them and what other suggestions they have for a better fit.

Student interest is important in selecting examples, illustrations, and analogies that teachers might use in presenting content, in designing student work that connects with student experiences and aspirations, and in grouping students. Learning profile is important in selection of teacher modes of presentation, designing student work that enables students to explore ideas and express learning in a range of ways, helping students access content, and grouping students. It's important to remember that a key practice in effective differentiation is flexible grouping. In regard to readiness, interest, and learning profile, groups should change often and should include opportunities to work with peers whose readiness levels, interests, and learning preferences are both similar to and different from one's own.

Planning Assessments with Student Variance in Mind

An assessment (including pre-assessments, formative or ongoing assessments, and summative assessments) is useful only if it succeeds in revealing what a student knows, understands, and can do at a given time. If a 3rd grader has a sound understanding of the water cycle but cannot write fluently, an assessment that requires writing a paragraph to describe the water cycle will be of little use to the teacher in developing a window into that child's level of proficiency on water cycles—not to mention discouraging the student who both knows that she understands what's important about the water cycle and knows that her inability to write keeps her from revealing that knowledge.

It's not imperative to differentiate every assessment; however, it's wise for a teacher to consider the fact that it might be short-sighted to differentiate instruction to support student success and then neglect to attend to students' learning differences on formative or summative assessments that are key to successful teaching and learning. Differentiating an assessment doesn't suggest creating different assessments, but rather ensuring access of opportunity for all students to demonstrate their learning.

In differentiating assessments, one attribute should almost always remain unchanged across all versions of the assessment: the knowledge, understanding, and skill for which students are responsible. The only exception to this guideline relates to students with individualized education plans (IEPs) that indicate a different curriculum or a different set of goals for the student. In those cases, assessments should, of course, mirror the goals prescribed for that particular student rather than someone else's. Beyond that, it's fine to modify nearly any other attribute of the assessment as long as it helps students to access the assessment directions and items or increases the likelihood that they can reveal what they have learned.

For example, it might be helpful to some students to orally record or to use a computer to enter their answers rather than writing them by hand. Some students might benefit from directions written in their first language so they are clear on the nature of the task. Some students might benefit from use of more complex language on the assessment because that language is appropriately challenging for their advanced stage of learning. On the other hand, some students might benefit from a version of the assessment that is written in simpler language or in bulleted form because long chunks of prose are problematic for them. It probably makes sense for some students to have a bit more time to complete the assessment or to be given its parts one at a time so they don't feel confused and overwhelmed. The show-and-tell format briefly explained in Figure 3.4 attends to variance in students' language proficiency. It's even okay if everyone doesn't have all the same questions, so that challenge level can match student development—as long as both versions of the assessment measure the same KUDs.

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In schools with a major emphasis on standardized tests, teachers are prone to conclude that their own assessments must always approximate the nature of the year-end standardized test so students will be "ready" for that test when it comes. Certainly it's wise in those contexts to help students learn how to do their best work on such tests. However, we ought not to lose sight of the fact that if all teaching is proscribed by the very limited and limiting format of a particular test, students' learning experiences are woefully restricted. More to the point, the purpose of the instructional cycle (including assessment) is to help students learn. If they learn better because of how we teach and assess them, it's likely they will fare better on standardized tests than if we insist on teaching them in narrow ways that are ineffective for them. When learning "works" for a student, that student is likely to enter a testing situation both more competently and confidently than would otherwise have been the case, and outcomes should be predictably better. Further, the student is more likely to find learning itself a positive experience and one worth repeating rather than avoiding.

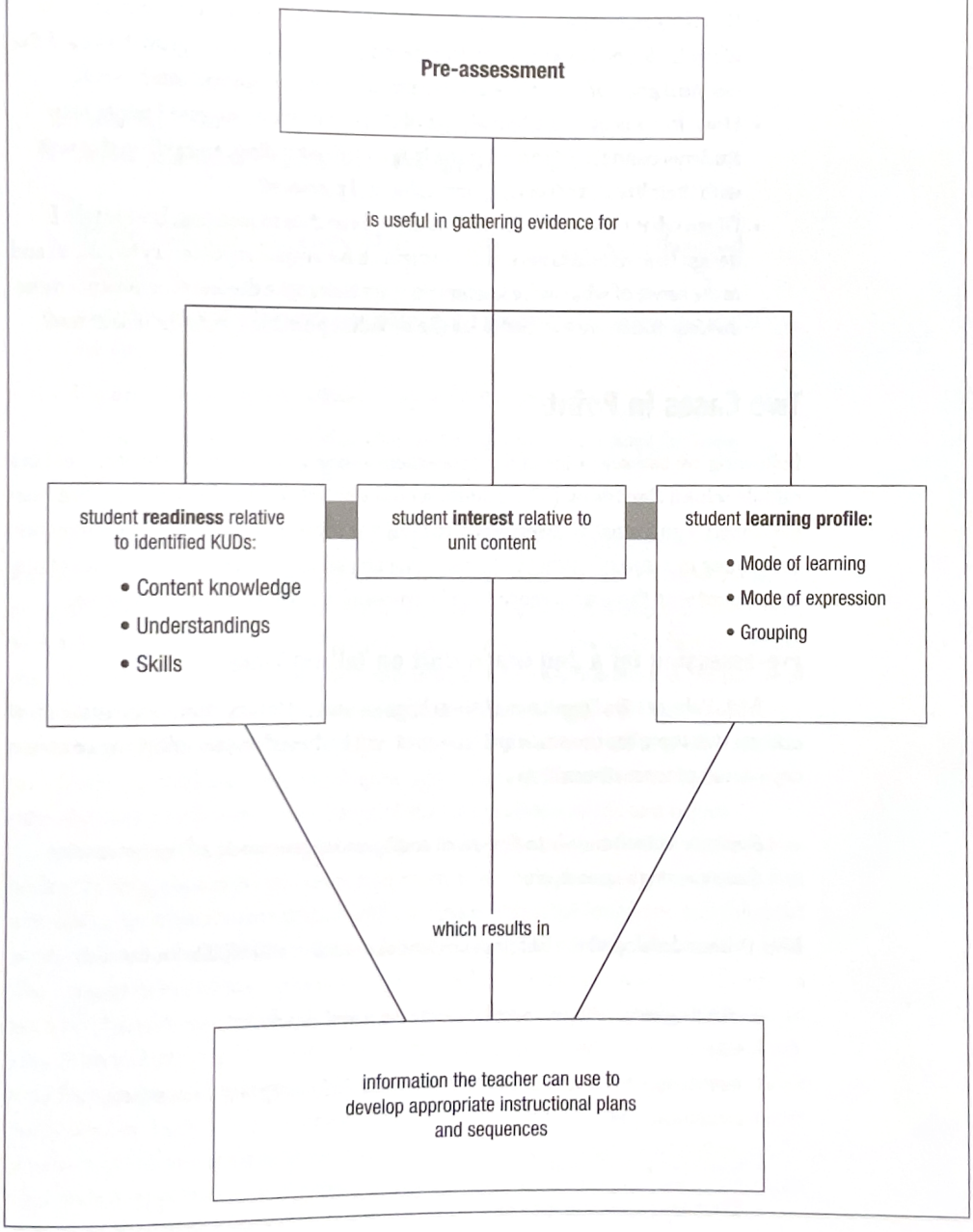
Designing and Using Pre-assessments: A Quick Review

Figure 3.7 summarizes the elements and purposes of pre-assessment. It highlights the role of pre-assessment in determining student readiness, interest, and learning profile.

It is likely clear at this point that implementing a pre-assessment so that the information it reveals can be used effectively to make instructional decisions requires thoughtful planning by the teacher. Planning quality pre-assessments calls on teachers to answer the following questions:

- What are the KUDs—the essential knowledge, understanding, and skill that form the core of the unit?
- What prerequisite knowledge, understanding, and skill should students have in order to succeed with the unit?
- What common misunderstandings do students often have about the unit's knowledge, understanding, or skills?
- What questions can I ask that appropriately sample the unit's KUDs, important prerequisite knowledge, and common misunderstandings?
- What is a reasonable amount of time to provide for the pre-assessment?
- Should it be administered in one sitting or across several?
- How long before the start of a new unit should the pre-assessment be administered so that I have time to review it, reflect on it, and plan with its results in mind?
- Are there students who would benefit from differentiation in the way the pre-assessment is written, designed, or administered?

Figure 3.7
Elements and Purposes of Pre-assessment



- What meaningful differences does the pre-assessment indicate exist among students in the class related to KUDs and prerequisite knowledge, understanding, and skill?
- Based on analysis of meaningful differences, what does this student or cluster of students need as a new unit begins to facilitate maximum growth toward the essential goals of the unit—and beyond them when appropriate?
- How does my evolving knowledge of student interests suggest I might help students connect important knowledge, understanding, and skill in this unit with their lives, experiences, strengths, and passions?
- Given what I know of students' varied approaches to learning, how might I design lessons and tasks so that students have ample opportunity to take in and make sense of what we're learning in ways that make the learning process more inviting and more successful for the broadest possible spectrum of learners?

Two Cases in Point

Following are two scenarios of pre-assessment—one in a primary classroom, one in a middle school classroom. (The middle school example on market analysis continues in Chapter 4 on formative assessment, to illustrate the use of assessment *for* instruction continuing in a unit of study.) Both examples model a teacher's design and use of pre-assessment with the goal of modifying instruction to address student readiness.

Pre-assessing for a 2nd Grade Unit on Telling Time

Mrs. Palmer's 2nd graders will soon begin a unit on telling time—the first formal unit on this topic for the students. The unit will be based on the following common core standard for mathematics:

> Students will tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

Mrs. Palmer developed the following essential question and KUDs for the unit:

> *Essential Question*: Why do people all over the world use clocks?
>
> *Know*:
>
> - Key vocabulary: *clock face, analog clock, digital clock, telling time, hour, minute, second, a.m., p.m.*
> - Clocks help us tell time.
> - There are 12 hours in the a.m.

- There are 12 hours in the p.m.
- There are 24 hours in a day.
- There are 60 minutes in an hour.
- There are 30 minutes in a half hour.
- There are 15 minutes in a quarter hour.

Understand:

- There are patterns in telling time and writing time.

Do:

- Tell time from digital and analog clocks to the hour, half hour, quarter hour, and five minutes.
- Write time from digital and analog clocks to the hour, half hour, quarter hour, and five minutes.
- Use *a.m.* and *p.m.* correctly when writing and telling time.
- Explain and apply the patterns in telling and writing time to the hour, half hour, quarter hour, and five minutes.

To pre-assess student readiness to tell time, Mrs. Palmer created a two-part activity for her students. She drew a large circle on pieces of paper for each student and asked them to use the circle to draw a clock that shows exactly 6 o'clock. She also asked them to use the back of the paper to tell what they know about clocks and time. Because her students had not yet formally studied time in school, she felt that the specific nature of the task with the circle and the open-ended task with writing about time would reveal prior knowledge some students brought to the unit as well as specific needs related to time that many students likely had. Figure 3.8 shows responses from six students in the class and clearly indicates a broad range of student readiness as the unit begins.

In reviewing the pre-assessments, Mrs. Palmer found some students who were unclear about the structure of a clock face, many who could accurately draw a clock face with hours positioned correctly but with confusion about the long hand and the short hand, some who could position the hours and the long and short hands correctly, a few who seemed to be aware of minutes but who could not place them with confidence, a few who placed them confidently but inaccurately, and a couple of students who could place minutes correctly. In addition, she noted a few students who provided little if any meaningful information about clocks and time, several whose information was accurate but limited, and several who appeared to understand the function of clocks with some precision, as well as writing time accurately and arranging events in a day chronologically. One student appeared to understand clocks and time at a level much more advanced than grade-level expectations.