

ASSESSMENT OF STUDENTS



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Assessment for Students.2

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TABLE OF CONTENTS

Licensing

1: Why Teach?

- Lesson 1.1: What do great teachers do differently?
- Lesson 1.2: Teaching Philosophy

2: The Changing Teaching Profession and You

- Lesson 2.1: The Joys of Teaching
- Lesson 2.2: Are There Challenges to Teaching?

3: The Learning Process

- Lesson 3.1: Teachers' Perspectives on Learning
- Lesson 3.2: Bloom's Taxonomy
- Lesson 3.3: Universal Design for Learning

4: Planning Instruction

- Lesson 4.1: Selecting General Learning Goals
- Lesson 4.2: Formulating Learning Objectives

5: Key Practices in Instruction

- Lesson 5.1: Planning Lessons
- Lesson 5.2: Involving all
- Lesson 5.3: Talk for Learning and Pair Work
- Lesson 5.4: Using Questions
- Lesson 5.5: Monitoring and Giving Feedback
- Lesson 5.6: Using Group Work
- Lesson 5.7: Storytelling, Songs, and More
- Lesson 5.8: Assessing Progress and Performance

6: Assessment

- Lesson 6.1: Assessment and Evaluation
- Lesson 6.2: Formative and Summative Assessment
- Lesson 6.3: More on Formative Assessment
- Lesson 6.4: Validity
- Lesson 6.5: Reliability

7: Keys to Effective Feedback

- Lesson 7.1: Feedback

8: Forms of Thinking

- Lesson 8.1: Forms of Thinking Associated with Classroom Learning
- Lesson 8.2: Critical Thinking and Creative Thinking

- [Lesson 8.3: Problem-Solving](#)
- [Lesson 8.4: Broad Instructional Strategies that Stimulate Complex Thinking](#)
- [Lesson 8.5: Questioning](#)

9: Creating Assessment Questions

- [Lesson 9.1: Basic Concepts](#)
- [Lesson 9.2: Absence of Bias](#)
- [Lesson 9.3: Selected Response Questions](#)
- [Lesson 9.4: Constructed Response Items](#)
- [Lesson 9.5: Rubrics](#)
- [Lesson 9.6: Performance Assessment](#)
- [Lesson 9.7: Portfolios](#)

10: Ethics and Legal Issues in Education

- [Lesson 10.1: Ethics](#)
- [Lesson 10.2: Integrity](#)
- [Lesson 10.3: Ethical or Unethical Practices in Testing](#)
- [Lesson 10.4: References](#)

11: Standardized Assessments

- [Lesson 11.1: Basic Concepts](#)
- [Lesson 11.2: High-Stakes Testing by States](#)
- [Lesson 11.3: Understanding Test Results](#)
- [Lesson 11.4: Issues with Standardized Tests](#)

[Index](#)

[Glossary](#)

[Glossary](#)

[Glossary](#)

[Detailed Licensing](#)

Licensing

A detailed breakdown of this resource's licensing can be found in [Back Matter/Detailed Licensing](#).

CHAPTER OVERVIEW

1: Why Teach?

[Lesson 1.1: What do great teachers do differently?](#)

[Lesson 1.2: Teaching Philosophy](#)

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Lesson 1.1: What do great teachers do differently?

What do great teachers do differently?

Think about your favorite teacher – a teacher that you learned a great deal from, who helped you to develop your potential or who made you feel at home in the classroom. What characteristics did this teacher have which allowed you to learn, be comfortable, or grow?

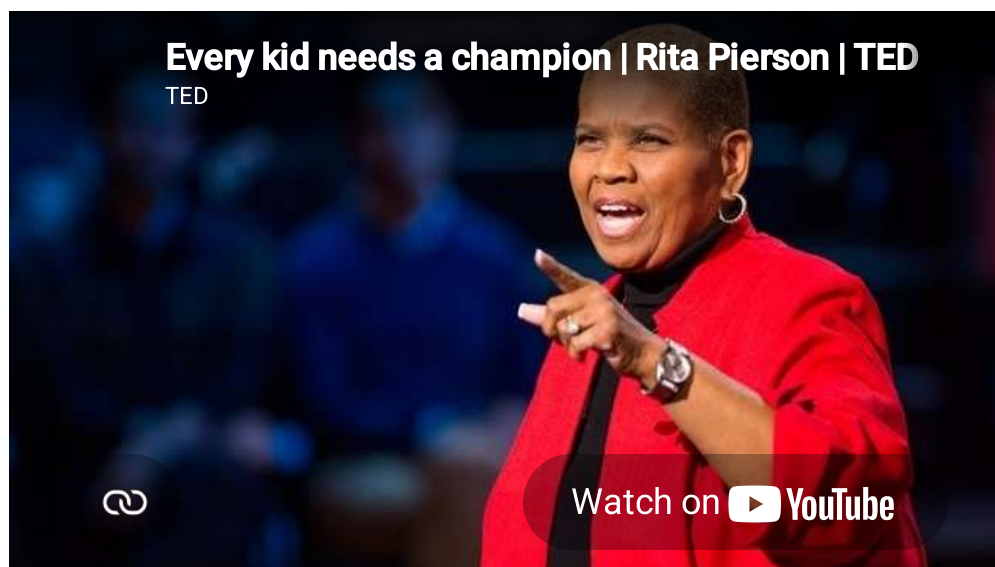
Self Reflection

1. Do I embody some of the same characteristics?
2. What do I need to do to display more of these characteristics?

WHY TEACH?

As we examine the characteristics of teachers in our school experience, it is likely we will see correlations between the student-teacher relationship and our performance or lack of ease in the classroom. As we look at teaching through this lens, we come to understand that teaching content is only one aspect of the teacher role. Creating an emotionally caring and educationally supportive environment in our classroom can give us an advantage in engaging students for learning.

The following TED Video is presented by Ms. Rita Pierson. Ms. Pierson is an inspiring former teacher who has a philosophy that all students can learn, and that a teacher can lift students to heights they never thought they could achieve. This presentation focuses on practical success and failure resulting from classroom relationships. Often pre-service teachers believe that they are preparing for a career that will require them only to teach the content. However, as teachers, we cannot shy away from the fact that we also teach complex human beings.





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Lesson 1.2: Teaching Philosophy

Philosophy:

There are many different ways to teach, varying circumstances to take into account, and philosophies to apply to each classroom. And what better way to have a positive impact on the world than to offer knowledge for consumption? The term ‘teacher’ can be applied to anyone who imparts knowledge of any topic, but it is generally more focused on those who are hired to do so (teach, n.d., n.p.). In imparting knowledge to our students, it is inevitable that we must consider our own personal philosophies, or pedagogies, and determine not only how we decide what our philosophies are, but also how those impact our consumers.

ACTIVITY

1. Make a list of the five most important characteristics of an excellent teacher.
 - Do you possess these characteristics?
 - If not, what steps can you take to add the characteristic(s)?
2. Write your teaching philosophy.
 - What will your style be?
 - What are your goals as a teacher?

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CHAPTER OVERVIEW

2: The Changing Teaching Profession and You

A teacher named Ashley reflects: She looked around the classroom, enjoying a blessed moment of quiet after the students left at the end of the day. "Ashley, the teacher, that's me", she said proudly to the empty room. "But why am I doing this?" she asked herself quietly—and realized she wasn't always sure of the answer. But then she remembered one reason: she was teaching for Nadia, who sat at the table to the left, always smiled so well and always (well, usually) tried hard. And another reason: she was teaching for Lincoln, tired old Lincoln, who needed her help more than he realized. She remembered twenty other reasons— twenty other students. And one last reason: she was also teaching for herself challenging herself to see if she really could keep up with twenty-two young people at once, and really accomplish something worthwhile with them. She was teaching so she could keep growing as a person, keep connecting with others, keep learning new ideas. That's why she was teaching.

[Lesson 2.1: The Joys of Teaching](#)

[Lesson 2.2: Are There Challenges to Teaching?](#)

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Lesson 2.1: The Joys of Teaching

Why be a teacher? The short answer is easy:

- to witness the diversity of growth in young people, and their joy in learning
- to encourage lifelong learning—both for yourself and for others
- to experience the challenge of devising and doing interesting, exciting activities for the young

There is, of course, more than this to be said about the value of teaching. Consider, for instance, the "young people" referred to above. In one class they could be six years old; in another they could be sixteen, or even older. They could be rich, poor, or somewhere in between. They could come from any ethnic background. Their first language could be English, or something else. There are all sorts of possibilities. But whoever the particular students are, they will have potential as human beings: talents and personal qualities—possibly not yet realized—that can contribute to society, whether as leaders, experts, or supporters of others. A teacher's job—in fact a teacher's privilege—is to help particular "young people" to realize their potential.

Another teacher reflects: Nathan paused for a deep breath before speaking to me. "It's not like I expected it to be," he said. "I've got five kids who speak English as a second language. I didn't expect that. I've got two, maybe three, with reading disabilities, and one of them has a part-time aide. I've had to learn more about using computers than I ever expected—they're a lot of curriculum materials online now, and the computers help the kids that need more practice or who finish activities early. I'm doing more screening and testing of kids than I expected, and it all takes time away from teaching. "But it's not all surprises. I expected to be able to 'light a fire' under kids about learning to read. And that has actually happened, at least sometimes with some children!" The joys of teaching

As a teacher, you will be able to do this by laying groundwork for lifelong learning. You will not teach any one student forever, of course, but you will often work with them long enough to convey a crucial message: that there is much in life to learn—more in fact than any one teacher or school can provide in a lifetime. The knowledge may be about science, math, or learning to read; the skills may be sports, music, or art—anything. Whatever you teach, its immensity can be a source of curiosity, wonder and excitement. It can be a reason to be optimistic about life in general and about your students in particular. Learning, when properly understood, is never-ending, even though it often focuses on short-term, immediate concerns. As a teacher, you will have an advantage not shared by every member of society, namely the excuse not only to teach valuable knowledge and skills, but to point students beyond what they will be able to learn from you. As an old limerick put it (before the days of gender-balanced language), "The world is full of such a plenty of things, I'm sure we should all be as happy as kings."

Jennifer Fuller, a third teacher reflects: "OK", suddenly getting businesslike in her tone. "Here's my typical day teaching tenth grade: I get up at 6:30, have a quick breakfast, get to school by 7:45 if the traffic's not bad. Then I check my email—usually there's a little stuff from the principal or some other administrator, maybe one or two from parents concerned because their child is doing poorly in one of my classes, maybe one or two from students—"I'm going to be sick today, Ms Fuller!"—that sort of thing. Now it's 8:15 and I have two hours before my first class—this term I teach only biology, and I only teach periods 2, 3, and 5. Maybe I have marking to do before class, or maybe I have to get a lab demonstration ready. Or maybe we all have to troupe down to the library for a staff meeting (groan...). Whatever I don't finish in the morning, I have to finish after school. But that's also when I meet with the Ecology Club (I'm the faculty advisor), so I might have to finish stuff in the evening. I try not to do it then, but a lot of times I have to. But I always quit by 9:00—that's always when I watch TV for an hour, or just "vegetate" with a book."

Whatever you teach, you will be able to feel the satisfaction of designing and orchestrating complex activities that communicate new ideas and skills effectively. The challenge is attractive to many teachers, because that is where they exercise judgment and "artistry" the most freely and frequently. Your students will depend on your skill at planning and managing, though sometimes without realizing how much they do so. Teachers will need you to know how to explain ideas clearly, to present new materials in a sensible sequence and at an appropriate pace, to point out connections between their new learning and their prior experiences. Although these skills really take a lifetime to master, they can be practiced successfully even by beginning teachers, and they do improve steadily with continued teaching over time. Right from the start, though, skill at design and communication of curriculum is one of the major "perks" of the job.

The very complexity of classroom life virtually guarantees that teaching never needs to get boring. Something new and exciting is bound to occur just when you least expect it. A student shows an insight that you never expected to see—or fails to show one that

you were sure he had. An activity goes better than expected— or worse, or merely differently. You understand for the first time why a particular student behaves as she does, and begin thinking of how to respond to the student's behavior more helpfully in the future. After teaching a particular learning objective several times, you realize that you understand it differently than the first time you taught it. And so on. The job never stays the same; it evolves continually. As long as you keep teaching, you will have a job with novelty.

Take a minute to reflect and answer this question, why do you teach?

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Lesson 2.2: Are There Challenges to Teaching?

Here, too, the simple answer is "yes". Every joy of teaching has a possible frustration related to it. You may wish to make a positive difference in students' lives, but you may also have trouble reaching individuals. A student seems not to learn much, or to be unmotivated, or unfriendly, or whatever. And some teaching problems can be subtle: when you call attention to the wonderful immensity of an area of knowledge, you might accidentally discourage a student by implying that the student can never learn "enough". The complexity of designing and implementing instruction can sometimes seem overwhelming, instead of satisfying. Unexpected events in your classroom can become chaos rather than an attractive novelty. To paraphrase a popular self-help book, sometimes "bad things happen to good teachers" (Kushner, 1983). But as in the rest of life, the "bad things" of teaching do not negate the value of the good. If anything, the undesired events make the good, desired ones even more satisfying, and render the work of teaching all the more valuable. As you will see throughout this book, there are resources for maximizing the good, the valuable, and the satisfying. You can bring these resources to your work, along with your growing professional knowledge and a healthy dose of common sense. In this sense you will not need to "go it alone" in learning to teach well. You will, however, be personally responsible for becoming and remaining the best teacher that you can possibly be; the only person who can make that happen will be you. Many of the resources for making this happen are described in this book in the chapters ahead.

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CHAPTER OVERVIEW

3: The Learning Process

When my son Michael was old enough to talk, and being an eager but naive dad, I decided to bring Michael to my educational psychology class to demonstrate to my students "how children learn". In one task I poured water from a tall drinking glass to a wide glass pie plate, which according to Michael changed the "amount" of water— there was less now than it was in the pie plate. I told him that, on the contrary, the amount of water had stayed the same whether it was in the glass or the pie plate. He looked at me a bit strangely, but complied with my point of view— agreeing at first that, yes, the amount had stayed the same. But by the end of the class session he had reverted to his original position: there was less water, he said, when it was poured into the pie plate compared to being poured into the drinking glass. So much for demonstrating "learning"!

(Kelvin Seifert)

Learning is generally defined as relatively permanent changes in behavior, skills, knowledge, or attitudes resulting from identifiable psychological or social experiences. A key feature is permanence: changes do not count as learning if they are temporary. You do not "learn" a phone number if you forget it the minute after you dial the number; you do not "learn" to eat vegetables if you only do it when forced. The change has to last. Notice, though, that learning can be physical, social, or emotional as well as cognitive. You do not "learn" to sneeze simply by catching cold, but you do learn many skills and behaviors that are physically based, such as riding a bicycle or throwing a ball. You can also learn to like (or dislike) a person, even though this change may not happen deliberately.

Each year after that first visit to my students, while Michael was still a preschooler, I returned with him to my educational psychology class to do the same "learning demonstrations". And each year Michael came along happily, but would again fail the task about the drinking glass and the pie plate. He would comply briefly if I "suggested" that the amount of water stayed the same no matter which way it was poured, but in the end he would still assert that the amount had changed. He was not learning this bit of conventional knowledge, in spite of my repeated efforts.

But the year he turned six, things changed. When I told him it was time to visit my educational psychology class again, he readily agreed and asked: "Are you going to ask me about the water in the drinking glass and pie plate again?" I said yes, I was indeed planning to do that task again. "That's good", he responded, "because I know that the amount stays the same even after you pour it. But do you want me to fake it this time? For your students' sake?"

[Lesson 3.1: Teachers' Perspectives on Learning](#)

[Lesson 3.2: Bloom's Taxonomy](#)

[Lesson 3.3: Universal Design for Learning](#)

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Lesson 3.1: Teachers' Perspectives on Learning

For teachers, learning usually refers to things that happen in schools or classrooms, even though every teacher can of course describe examples of learning that happen outside of these places. Even Michael, at age 6, had begun realizing that what counted as "learning" in his dad's educator-type mind was something that happened in a classroom, under the supervision of a teacher (me). For me, as for many educators, the term has a more specific meaning than for many people less involved in schools. In particular, teachers' perspectives on learning often emphasize three ideas, and sometimes even take them for granted: (1) curriculum content and academic achievement, (2) sequencing and readiness, and (3) the importance of transferring learning to new or future situations.

Viewing learning as dependent on curriculum

When teachers speak of learning, they tend to emphasize whatever is taught in schools deliberately, including both the official curriculum and the various behaviors and routines that make classrooms run smoothly. In practice, defining learning in this way often means that teachers equate learning with the major forms of academic achievement— especially language and mathematics— and to a lesser extent musical skill, physical coordination, or social sensitivity (Gardner, 1999, 2006). The imbalance occurs not because the goals of public education make teachers responsible for certain content and activities (like books and reading) and the skills which these activities require (like answering teachers' questions and writing essays). It does happen not (thankfully!) because teachers are biased, insensitive, or unaware that students often learn a lot outside of school.

A side effect of thinking of learning as related only to curriculum or academics is that classroom social interactions and behaviors become issues for teachers— become things that they need to manage. In particular, having dozens of students in one room makes it more likely that I, as a teacher, think of "learning" as something that either takes concentration (to avoid being distracted by others) or that benefits from collaboration (to take advantage of their presence). In the small space of a classroom, no other viewpoint about social interaction makes sense. Yet in the wider world outside of school, learning often does happen incidentally, "accidentally" and without conscious interference or input from others: I "learn" what a friend's personality is like, for example, without either of us deliberately trying to make this happen. As teachers, we sometimes see incidental learning in classrooms as well, and often welcome it; but our responsibility for curriculum goals more often focuses our efforts on what students can learn through conscious, deliberate effort. In a classroom, unlike in many other human settings, it is always necessary to ask whether classmates are helping or hindering individual students' learning.

Focusing learning on changes in classrooms has several other effects. One, for example, is that it can tempt teachers to think that what is taught is equivalent to what is learned— even though most teachers know that doing so is a mistake, and that teaching and learning can be quite different. If I assign a reading to my students about the Russian Revolution, it would be nice to assume not only that they have read the same words, but also learned the same content. But that assumption is not usually the reality. Some students may have read and learned all of what I assigned; others may have read everything but misunderstood the material or remembered only some of it; and still others, unfortunately, may have neither read nor learned much of anything. Chances are that my students would confirm this picture, if asked confidentially. There are ways, of course, to deal helpfully with such diversity of outcomes; for suggestions, see especially Chapter 10 and Chapter 11. But whatever instructional strategies I adopt, they cannot include assuming that what I teach is the same as what students understand or retain of what I teach.

Viewing learning as dependent on sequencing and readiness

The distinction between teaching and learning creates a secondary issue for teachers, that of educational **readiness**. Traditionally the concept referred to students' preparedness to cope with or profit from the activities and expectations of school. A kindergarten child was "ready" to start school, for example, if he or she was in good health, showed moderately good social skills, could take care of personal physical needs (like eating lunch or going to the bathroom unsupervised), could use a pencil to make simple drawings, and so on. Table **Lesson3.1.1** shows a similar set of criteria for determining whether a child is "ready" to learn to read (Copple & Bredekamp, 2006). At older ages (such as in high school or university), the term readiness is often replaced by a more specific term, prerequisites. To take a course in physics, for example, a student must first have certain prerequisite experiences, such as studying advanced algebra or calculus. To begin work as a public school teacher, a person must first engage in practice teaching for a period of time (not to mention also studying educational psychology!).

Table **Lesson3.1.1**: Reading readiness in students vs in teachers

Signs of readiness in the child or student	Signs of readiness to teach reading
• productive (speaking) vocabulary of 5,000- 8,000 words • child understands and uses complete sentences • child's questions tend to be relevant to the task at hand • child's correctly using most common grammatical constructions • child can match some letters to some sounds • child can string a few letters together to make a few simple words • child can tell and retell stories, poems, and songs	• teacher answers children's questions when possible • teacher encourages child to find out more through other means in addition to asking teacher • teacher asks questions designed to elaborate or expand child's thinking • teacher highlights letters and sounds in the classroom • teacher provides lots of paper and marking tools • teacher assists child with initial writing of letters • teacher encourages children to enact stories, poems, and songs
Source: Copple & Bredekamp, 2006.	

Note that this traditional meaning, of readiness as preparedness, focuses attention on students' adjustment to school and away from the reverse: the possibility that schools and teachers also have a responsibility for adjusting to students. But the latter idea is in fact a legitimate, second meaning for **readiness**: If 5-year-old children normally need to play a lot and keep active, then it is fair to say that their kindergarten teacher needs to be "ready" for this behavior by planning for a program that allows a lot of play and physical activity. If she cannot or will not do so (whatever the reason may be), then in a very real sense this failure is not the children's responsibility. Among older students, the second, teacher-oriented meaning of readiness makes sense as well. If a teacher has a student with a disability (for example, the student is visually impaired), then the teacher has to adjust her approach in appropriate ways— not simply expect a visually impaired child to "sink or swim". As you might expect, this sense of readiness is very important for special education, so I discuss it further in Chapter 5. But the issue of readiness also figures importantly whenever students are diverse (which is most of the time), so it also comes up in Chapter 5.

Viewing transfer as a crucial outcome of learning

Still another result of focusing the concept of learning on classrooms is that it raises issues of usefulness or transfer, which is the ability to use knowledge or skill in situations beyond the ones in which they are acquired. Learning to read and learning to solve arithmetic problems, for example, are major goals of the elementary school curriculum because those skills are meant to be used not only inside the classroom, but outside as well. We teachers intend, that is, for reading and arithmetic skills to "transfer", even though we also do our best to make the skills enjoyable while they are still being learned. In the world inhabited by teachers, even more than in other worlds, making learning fun is certainly a good thing to do, but making learning useful as well as fun is even better. Combining enjoyment and usefulness, in fact, is a "gold standard" of teaching: we generally seek it for students, even though we may not succeed at providing it all of the time.

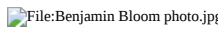
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Lesson 3.2: Bloom's Taxonomy

Mary Forehand (The University of Georgia)

Bloom's Taxonomy is a classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding.

 Figure **Lesson3.2.1**: Photograph of Benjamin Bloom (Copyright; Wikimedia Commons CC-BY-SA)

Biography

Introduction

History

- **Learning, teaching, identifying educational goals, and thinking are all complicated concepts interwoven in an intricate web.**

Discussions during the 1948 Convention of the American Psychological Association led Bloom to spearhead a group of educators who eventually undertook the ambitious task of classifying educational goals and objectives. Their intent was to develop a method of classification for thinking behaviors that were believed to be important in the processes of learning. Eventually, this framework became a taxonomy of three domains:

- The **cognitive** – knowledge based domain, consisting of six levels
- affective** – attitudinal based domain, consisting of five levels, and
- psychomotor** – skills based domain, consisting of six levels.

While Bloom pushed for the use of the term “taxonomy,” others in the group resisted because of the unfamiliarity of the term within educational circles.

What is Bloom's Taxonomy?

“taxonomy” and “classification” are synonymous helps dispel uneasiness with the term. Bloom's Taxonomy is a multi-tiered model of classifying thinking according to six cognitive levels of complexity. Throughout the years, the levels have often been depicted as a stairway, leading many teachers to encourage their students to “climb to a higher (level of) thought”.

Revised Bloom's Taxonomy (RBT)

Terminology changes

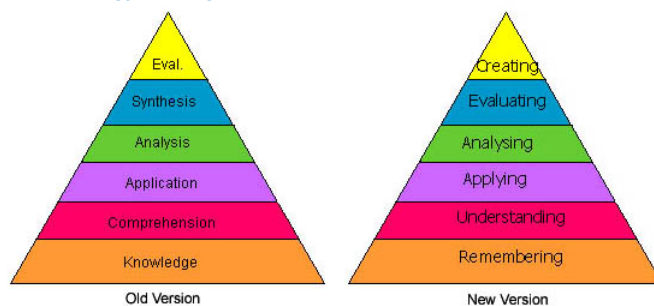


Figure **Lesson3.2.2**: Terminology changes “The graphic is a representation of the NEW verbiage associated with the long familiar Bloom's Taxonomy. Note the change from Nouns to Verbs [e.g., Application to Applying] to describe the different levels of the taxonomy. Note that the top two levels are essentially

exchanged from the Old to the New version.” (Schultz, 2005) (Evaluation moved from the top to Evaluating in the second from the top, Synthesis moved from second on top to the top as Creating.). (Copyright; Lorin Anderson via [Carnegie Mellon University](#))

- **Remembering:** Retrieving, recognizing, and recalling relevant knowledge from long-term memory.
 - **Understanding:** Constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.
 - **Applying:** Carrying out or using a procedure through executing, or implementing.
 - **Analyzing:** Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, and attributing.
 - **Evaluating:** Making judgments based on criteria and standards through checking and critiquing.
 - **Creating:** Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing.
- (Anderson & Krathwohl, 2001, pp. 67-68)

Structural changes

Bloom's Taxonomy							
The Knowledge Dimension	The Cognitive Process Dimension						
	Remember	Understand	Apply	Analyze	Evaluate	Create	
	Factual Knowledge	List	Summarize	Classify	Order	Rank	Combine
	Conceptual Knowledge	Describe	Interpret	Experiment	Explain	Assess	Plan
	Procedural Knowledge	Tabulate	Predict	Calculate	Differentiate	Conclude	Compose
	Meta-Cognitive Knowledge	Appropriate Use	Execute	Construct	Achieve	Action	Actualize

Designer/Developer - Dianna Fisher

Table **Lesson3.2.1:** Bloom's Taxonomy. (Dianna Fisher,

via [Oregon State University](#), Extended Campus)

Changes in emphasis

Why use Bloom's Taxonomy?

- Today's teachers must make tough decisions about how to spend their classroom time. Clear alignment of educational objectives with local, state, and national standards is a necessity.

How can Bloom's Taxonomy be used?

Included is an article entitled, “Using the Revised Taxonomy to Plan and Deliver Team-Taught, Integrated, Thematic Units” (Ferguson, 2002).

- **Remember:** Describe where Goldilocks lived.
 - **Understand:** Summarize what the Goldilocks story was about.
 - **Apply:** Construct a theory as to why Goldilocks went into the house.
 - **Analyze:** Differentiate between how Goldilocks reacted and how you would react in each story event.
 - **Evaluate:** Assess whether or not you think this really happened to Goldilocks.
 - **Create:** Compose a song, skit, poem, or rap to convey the Goldilocks story in a new form.
- Although this is a very simple example of the application of Bloom's taxonomy the author is hopeful that it will demonstrate both the ease and the usefulness of the Revised Taxonomy Table.

Bloom's Taxonomy

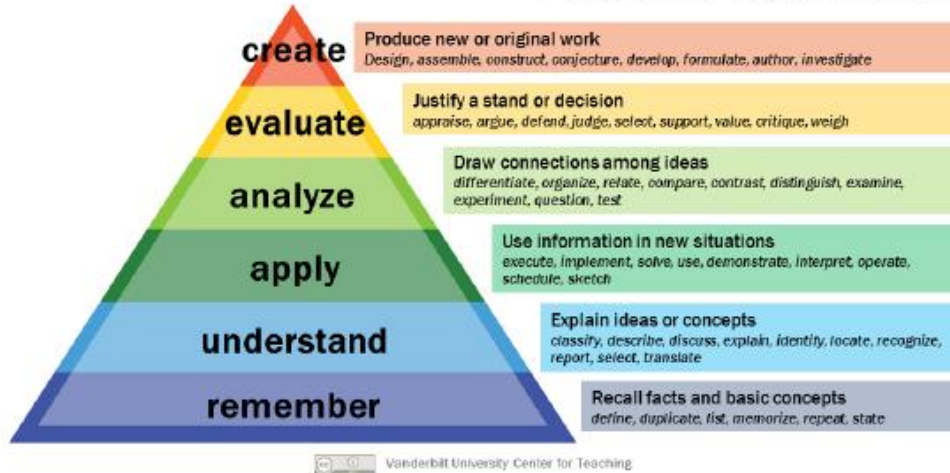


Figure **Lesson3.2.3**: Bloom's Taxonomy. (CC-BY; Vanderbilt University Center for Teaching)

Conclusion

Media

“Bloom’s Taxonomy of the Cognitive Domain Explained”



<https://granite.pressbooks.pub/teachingdiverselearners/?p=255>

Extended Campus- Oregon State University has an interactive Bloom’s Taxonomy chart of the **six Cognitive Process** dimensions (Remember, Understand, Apply, Analyze, Evaluate, and Create) with the **four Knowledge Dimensions** (defined as Factual, Conceptual, Procedural, and Meta-Cognitive) forming a grid with twenty-four separate cells as represented.

Printable Taxonomy Table [Examples](#) to clearly define the “**Essential Question**” or **lesson objectives**.

Online resources on Bloom's Taxonomy

[Sample Question Stems Based on Revised Bloom’s Taxonomy](#)

Bloom’s Revised Taxonomy: Mathematics

Bloomin Apps”

References

https://textbookequity.org/Textbooks/Orey_Emergin_Perspectives_Learning.pdf

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- **1.8: Bloom's Taxonomy** is licensed [CC BY-NC-SA 4.0](#).

Lesson 3.3: Universal Design for Learning

"Universal design is an instructional approach that gives particular attention to students who have physical, sensory, and cognitive disabilities. Like differentiated instruction, universal design embraces the idea that instruction should be designed from the beginning with students' diverse needs in mind."

Valtu, Sims, and Nelson
In *Connecting Teachers, Students, and Standards: Strategies for
Success in Diverse and Inclusive Classrooms* (viii)

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1. Multiple Means of Representation
2. Multiple Means of Action and Expression
3. Multiple Means of Engagement

UDL at a Glance

"Bust all barriers to learning that millions of people experience every day."

Click here to watch this YouTube video (4:36 minutes)



<https://granite.pressbooks.pub/teachingdiverselearners/?p=274>

UDL Instructional Module

<https://iris.peabody.vanderbilt.edu/udl/>

- Understand the principles of Universal Design for Learning (UDL)
- Be able to apply the Universal Design for Learning principles to the components of a curriculum

Myths and Misconceptions about UDL

UDL is only for learners with disabilities.

UDL aims to remove barriers to learning and supports inclusive institutional and teaching practices that reach all learners. As many post-secondary institutions must support large student populations and students usually participate in large class sizes, UDL practices ensure that a large, diverse student body still has access to learning in ways that support their individual needs. Therefore, instructors still need to consider using UDL in their pedagogy, even if they do not have learners with disabilities in their courses. It is important to remember that those students who vary in age, gender, cultural background, first language and abilities will also benefit from UDL.

Incorporating UDL into pedagogy lowers academic rigor.

UDL does not replace regular program, course and assessment objectives. UDL practices simply support the use of multiple means of representation, multiple means of action and expression and multiple means of engagement to support all learners in meeting these objectives. It may be argued that academic rigour increases, as students are expected to express materials in multiple ways, limiting options for memorization and increasing the likelihood of deep learning.

UDL has no research behind it.

UDL research has been conducted in many fields, by varying researchers with the support of numerous institutions. Its framework resulted from thorough research in the fields of cognitive science, cognitive neuroscience, neuropsychology and neuroscience. UDL guidelines and practices were a direct result of intensive research and investigation both supported by experimental and quantitative evidence as well as scholarly reviews and expert opinions. A compilation of the past 10 years of UDL research can be located on the [National Center of Universal Design for Learning](https://www.ncl.wisc.edu/) website.

To make UDL work, you have to use technology.

It is true that technology can effectively support learning in today's classroom and can play an important role in the implementation of UDL. However, in order to support UDL and apply it effectively, technology is not a requirement if it is not available. . Instructors can still support student learning with no-tech or low-tech options as UDL classrooms focus on flexible learning methods to support learning not just technological ones. The following resources provide some low/no tech UDL classroom options:

1. Example of a [Technology-less lesson](#) by Rose, Gravel, & Domings (2010)
2. [Technology-less options according to UDL principles](#) by Prince George County Public Schools

UDL is just good teaching.

UDL does not automatically assume or result in good teaching. The term “good” is often judged subjectively and therefore not an ideal term for academic discussion. **UDL principles, guidelines and checkpoints provide a clear framework that informs intentional teaching practices.** Effective teaching will support opportunities for BOTH instructors and students to assess learning meaningfully and frequently in an inclusive physical and intellectual environment. However, unless an instructor is referencing the UDL framework and applying the UDL principles in order to make decisions, assess and/or inform, they are not implementing UDL.



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youtu.be/KuTJJQWnMaQ



IMPORTANT UDL Resources:

Universal Design for Learning (UDL) for Specific Learning Disability (or difficulty) in: mathematical calculation and problem solving.

Get the UDL Guidelines in **full-text format** (Word): A complete narrative describing the context within which CAST developed the UDL Guidelines including explanations and examples of each principle and checkpoint.

[UDL Guidelines on this CAST graphic organizer](#)

Additional instructional modules and other resources on UDL

www.cast.org/our-work/about-u...l#.WaQvoiiGPIU

MAST Modules on Universal Design for Learning: Modules Addressing Special Education and Teacher Education

[Universal Design for Learning: An Introduction](#)

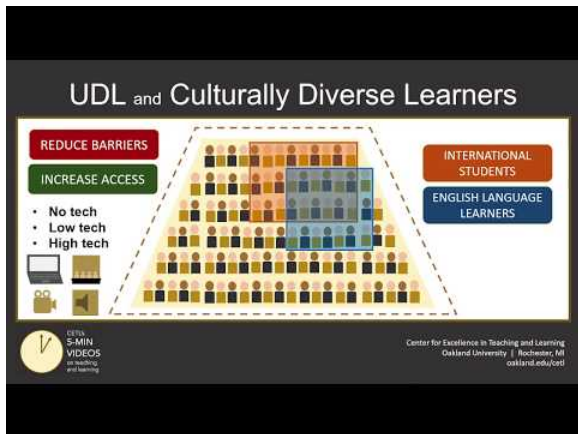
[Elementary Lesson Planning](#)

[High School Lesson Planning](#)

[Students in the Adapted Curriculum](#)

The ASHA Leader, 16 (10), 14-17. doi 10. 1044/leader.FTR2.16102011.14 Retrieved from <http://leader.pubs.asha.org/article.aspx?articleid=2279147>

Culturally diverse students, such as international students or English language learners. The target audience is higher education, however the strategies are completely relevant to K-12 environments.



<https://granite.pressbooks.pub/teachingdiverselearners/?p=274>

Universal Design for Learning (Part 6): Culturally Diverse Learners. [Video File]. Retrieved from youtu.be/R6t60Fh23iA Creative Commons Attribution license (reuse allowed)

References

youtu.be/bDvKnY0g6e4

<https://iris.peabody.vanderbilt.edu/udl/>

www.alludl.ca/myths-misconceptions (CC BY NC SA)

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CHAPTER OVERVIEW

4: Planning Instruction

"If you don't know where you're going, you could end up someplace else." - Casey Stengel

Casey Stengel, a much-admired baseball coach, was talking about baseball when he made this remark. But he could easily have been speaking of teaching as well. Almost by definition, education has purposes, goals, and objectives, and a central task of teaching is to know what these are and to transform the most general goals into specific objectives and tasks for students. Otherwise, as Casey Stengel said, students may end up "someplace else" that neither they, nor the teacher, nor anyone else intends. A lot of the clarification and specification of goals needs to happen before a cycle of instruction actually begins, but the benefits of planning happen throughout all phases of teaching. If students know precisely what they are supposed to learn, they can focus their attention and effort more effectively. If the teacher knows precisely what students are supposed to learn, then the teacher can make better use of class time and choose and design assessments of their learning that are more fair and valid. In the long run everyone benefits.

This chapter is about **instructional planning**, the systematic selection of educational goals and objectives and their design for use in the classroom. We will divide this idea into four parts, and discuss them one at a time. First is the problem of selecting general goals to teach; where can a teacher find these, and what do they look like? Second is the problem of transforming goals into specific objectives, or statements concrete enough to guide daily activity in class; what will students actually *do* or *say* into order to learn what a teacher wants them to learn? Third is the problem of balancing and relating goals and objectives to each other; since we may want students to learn numerous goals, how can we combine or integrate them so that the overall classroom program does not become fragmented or biased? Fourth is the challenge of relating instructional goals to students' prior experiences and knowledge. We have discussed this challenge before from the perspective of learning theory (in Chapter 2), but in this chapter we look at it from the more practical perspective of curriculum planning.

[Lesson 4.1: Selecting General Learning Goals](#)

[Lesson 4.2: Formulating Learning Objectives](#)

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Lesson 4.1: Selecting General Learning Goals

At the most general or abstract level, the goals of education include important philosophical ideas like "developing individuals to their fullest potential" and "preparing students to be productive members of society". Few teachers would disagree with these ideas in principle, though they might disagree about their wording or about their relative importance. As a practical matter, however, teachers might have trouble translating such generalities into specific lesson plans or activities for the next day's class. What does it mean, concretely, to "develop an individual to his or her fullest potential"? Does it mean, for example, that a language arts teacher should ask students to write an essay about their personal interests, or does it mean that the teacher should help students learn to write as well as possible on any topic, even ones that are not of immediate interest? What exactly should a teacher do, from day to day, to "prepare students to be productive members of society" as well? Answers to questions like these are needed to plan instruction effectively. But the answers are not obvious simply by examining statements of general educational goals.

National and state learning standards

Some (but not all) of the work of transforming such general purposes into more precise teaching goals and even more precise objectives has been performed by broad US organizations that represent educators and other experts about particular subjects or types of teaching (Riley, 2002). The groups have proposed **national standards**, which are summaries of what students can reasonably be expected to learn at particular grade levels and in particular subjects areas. In the United States, in addition, all state governments create **state standards** that serve much the same purpose: they express what students in the state should (and hopefully can) learn at all grade levels and in all subjects. Examples of organizations that provide national standards are listed in Table 27, and examples of state standards are listed in Table 28 for one particular state, Ohio, in the area of language arts.

Table *Lesson4.1.1*: Organizations with statements of US educational standards

Subject	Organization
English and Language Arts	Council of Teachers of English American Council on the Teaching of Foreign Languages
Mathematics	National Council of Teachers of Mathematics
Physical Education and Health	National Association for Sport and Physical Education American Cancer Society
Science	National Academies of Science American Association for the Advancement of Science
Social Studies	National Council for the Social Studies Center for Civic Education National Council on Economic Education National Geographic Society National Center for History in the Schools
Technology	International Society for Technology in Education
Other Specialized Standards Statements:	
American Indian Content Standards	Center for Educational Technology in Indian America
Ethical Standards for School Counselors	American School Counselors Association
Information Literacy Standards	American Association of School Librarians
Business Education	National Business Education Association
Parent Education and Involvement	Parent-Teacher Association (PTA)
Source: <http://www.education-world.com/standards>, accessed December 5, 2006. Summaries of all of these standards, as well as access to the relevant web pages of the corresponding organizations, can be found at this website. Because standards are revised continually, and because of the dynamic nature of websites, the information may differ slightly from the above when you actually access it.	

Table **Lesson4.1.2:** Examples of state curriculum standards about language arts

Grade-level:	Classroom example:
Kindergarten-Grade 3: Read accurately high- frequency sight words.	Play a game: "How many words can you see around the classroom that you can read already?"
Grade 4-7: Infer word meaning through identification and analysis of analogies and other word relationships.	Have students keep a journal of unfamiliar words which they encounter and of what they think the words mean.
Grade 8-10: Recognize the importance and function of figurative language.	Have students write a brief essay explaining the meaning of a common figure of speech, and speculating on why it became common usage.
Grade 11-12: Verify meanings of words by the author's use of definition, restatement, example, comparison, contrast and cause and effect.	Have students analyze an essay that includes unfamiliar terms using clues in the essay to determine their meaning.
Source for standards: Ohio Department of Education, 2003, p. 30-31	

Because they focus on grade levels and subject areas, general statements of educational standards tend to be a bit more specific than the broader philosophical goals we discussed above. As a rule of thumb, too, state standards tend to be more comprehensive than national standards, both in coverage of grade levels and of subjects. The difference reflects the broad responsibility of states in

the United States for all aspects of public education; national organizations, in contrast, usually assume responsibility only for a particular subject area or particular group of students. Either type of standards provides a first step, however, toward transforming the grandest purposes of schooling (like developing the individual or preparing for society) into practical classroom activities. But they provide a first step only. Most statements of standards do not make numerous or detailed suggestions of actual activities or tasks for students, though some might include brief classroom examples— enough to clarify the meaning of a standard, but not enough to plan an actual classroom program for extended periods of time. For these latter purposes, teachers rely on more the detailed documents, the ones often called *curriculum frameworks* and *curriculum guides*.

Curriculum frameworks and curriculum guides

The terms *curriculum framework* and *curriculum guide* sometimes are used almost interchangeably, but for convenience we will use them to refer to two distinct kinds of documents. The more general of the two is **curriculum framework**, which is a document that explains how content standards can or should be organized for a particular subject and at various grade levels. Sometimes this information is referred to as the **scope and sequence** for a curriculum. A curriculum framework document is like a standards statement in that it does not usually provide a lot of detailed suggestions for daily teaching. It differs from a standards statement, though, in that it analyzes each general standard in a curriculum into more specific skills that students need to learn, often a dozen or more per standard. The language or terminology of a framework statement also tends to be somewhat more concrete than a standards statement, in the sense that it is more likely to name behaviors of students— things that a teacher might see them do or hear them say. Sometimes, but not always, it may suggest ways for assessing whether students have in fact acquired each skill listed in the document. Table 29 shows a page from a curriculum framework published by the California State Board of Education (Curriculum Development and Supplemental Materials Committee, 1999). In this case the framework explains the state standards for learning to read, and the excerpt in Table 29 illustrates how one particular standard, that "students speak and write with command of English conventions appropriate to this grade level", is broken into nine more specific skills. Note that the excerpt names observable behaviors of students (what they do or say); we will discuss this feature again, more fully, in the next part of this chapter, because it is helpful in classroom planning. In spite of this feature, though, the framework document does not lay out detailed activity plans that a teacher could use on a daily basis. (Though even so, it is over 300 pages long!)

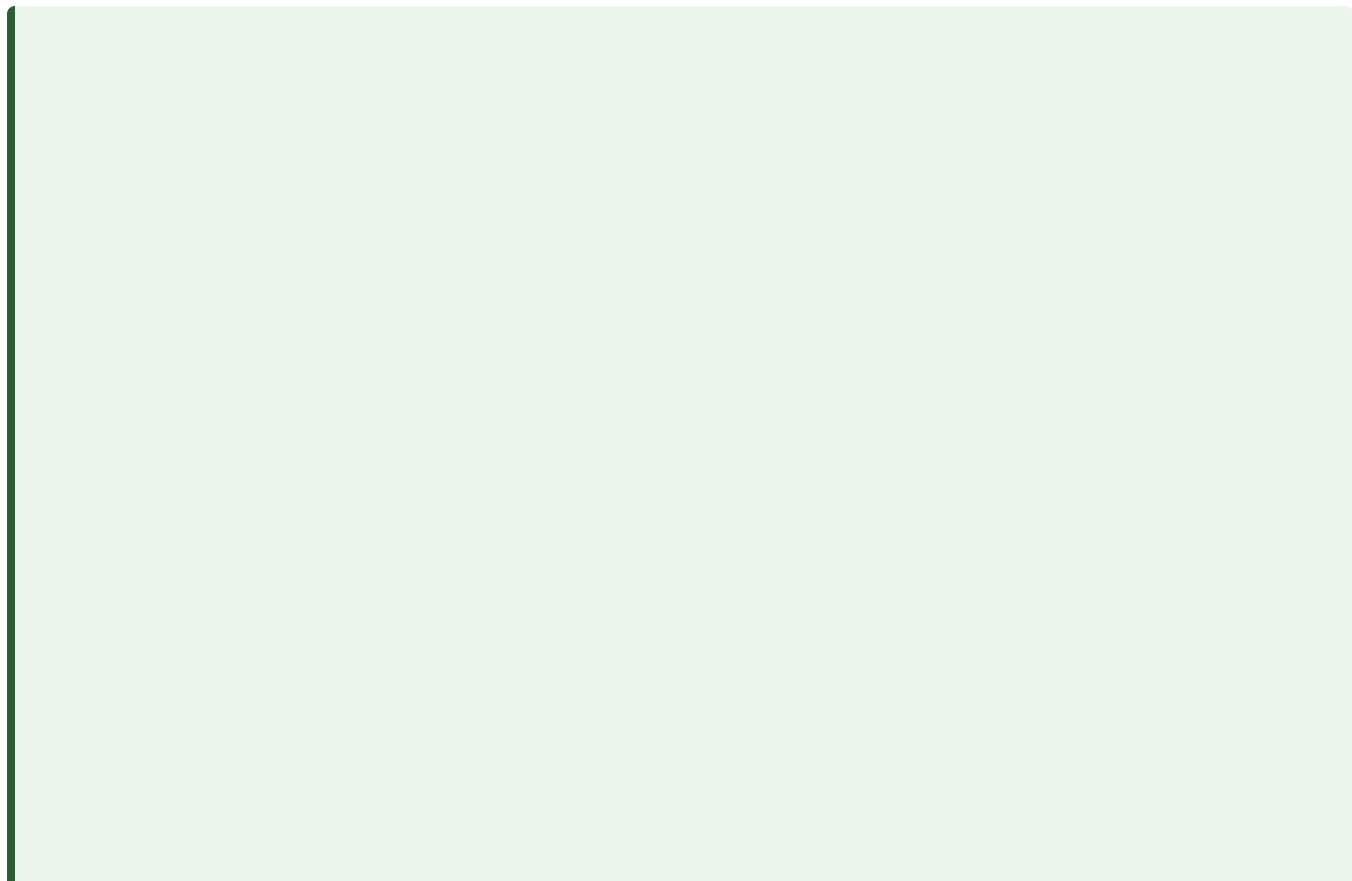


 Table *Lesson4.1.3*: An Excerpt from Reading/Language Arts Framework for California Public Schools

Comments:

Written and oral English language conventions, third grade
Students write and speak with a command of standard English conventions appropriate to this grade level.

Sentence Structure

1.1 Understand and be able to use complete and correct declarative, interrogative, imperative, and exclamatory sentences in writing and speaking.

Grammar

1.2 Identify subjects and verbs that are in agreement and identify and use pronouns, adjectives, compound words, and articles correctly in writing and speaking.

1.3 Identify and use past, present, and future verb tenses properly in writing and speaking.

1.4 Identify and use subjects and verbs correctly in speaking and writing simple sentences.

Punctuation

1.5 Punctuate dates, city and state, and titles of books correctly.

1.6 Use commas in dates, locations, and addresses and for items in a series.

Capitalization

1.7 Capitalize geographical names, holidays, historical periods, and special events correctly.

Spelling

1.8 Spell correctly one-syllable words that have blends, contractions, compounds, orthographic patters, and common homophones.

1.9 Arrange words in alphabetical order.

Teachers' need for detailed activity suggestions is more likely to be met by a **curriculum guide**, a document devoted to graphic descriptions of activities that foster or encourage the specific skills explained in a curriculum framework document. The descriptions may mention or list curriculum goals served by an activity, but they are also likely to specify materials that a teacher needs, time requirements, requirements for grouping students, drawings or diagrams of key equipment or materials, and sometimes even suggestions for what to say to students at different points during the activity. In these ways the descriptions may resemble lesson plans.

Since classroom activities often support more than one specific skill, activities in a curriculum guide may be organized differently than they might be in a framework document. Instead of highlighting only one standard at a time, as the framework document might, activities may be grouped more loosely— for example, according to the dominant purpose or goal of an activity ("Activities that encourage the practice of math facts") or according to a dominant piece of equipment or material ("Ten activities with tin cans"). Table 30 shows a description of a kindergarten-level activity about "autumn leaves" that might appear in a curriculum guide. Note that the activity meets several educational objectives at once— tracing shapes, knowledge of leaves and of colors, descriptive language skill. Each of these skills may reflect a different curriculum standard.

 Table *Lesson4.1.4*: Activity: Autumn Leaves

Level: Kindergarten

Themes and Curriculum Connections: trees, autumn, color naming, color comparisons, size comparisons, functions of leaves, growth, the life cycle. See also Standards #xx-yy.

Best time to do it: Fall (October), or whenever leaves are available

Materials needed: (1) small paper (6 x 6 inches); (2) access to leaves; (3) white glue; (4) felt pens or colored pencils

What to do: Give one piece of the small paper to each child. Invite children to color the sheet so that the entire sheet is decorated. Invite children to choose one leaf. Place leaf under the colored (decorated) paper and trace the shape of the leaf lightly in pencil. Then invite children to cut out the colored paper in the shape that has been traced of the leaf.

Cautions: (1) Some children may need individual help with tracing or cutting. (2) Try to use leaves that are still somewhat pliable, because some very old leaves (dried out) may crumble when traced.

Things to talk about: Are some leaves bigger than others? Do they change shape as they grow, or only their size? How do leaves benefit trees? How many different colors can real leaves be?

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Lesson 4.2: Formulating Learning Objectives

Given curriculum frameworks and guides like the ones just described, how do you choose and formulate actual learning objectives? Basically there are two approaches: either start by selecting content or topics that what you want students to know (the cognitive approach) or start with what you want students to do (the behavioral approach). In effect the cognitive approach moves from the general to the specific, and the behavioral approach does the opposite. Each approach has advocates, as well as inherent strengths and problems. In practice, teachers often combine or alternate between them in order to give students some of the advantages of each.

From general to specific: selecting content topics

The cognitive approach assumes that teachers normally have a number of long-term, general goals for students, and it begins with those goals. It also assumes that each student work toward long-term, general goals along different pathways and using different styles of learning. Because of these assumptions, it is necessary to name **indicators**, which are examples of specific behaviors by which students might show success at reaching a general learning goal. But it is neither desirable nor possible for a list of indicators to be complete— only for it to be representative (Gronlund, 2004). Consider this example from teaching middle-school biology. For this subject you might have a general goal like the following, with accompanying indicators:

Goal:

The student will understand the nature and purpose of photosynthesis.

Indicators:

1. explains the purpose of photosynthesis and steps in the process
2. diagrams steps in the chemical process
3. describes how plant photosynthesis affects the animal world
4. writes a plan for how to test leaves for presence of photosynthesis
5. makes an oral presentation and explains how the experiment was conducted

Using a strictly cognitive approach to planning, therefore, a teacher's job has two parts. First she must identify, find, or choose a manageable number of general goals— perhaps just a half dozen or so. (Sometimes these can be taken or adapted from a curriculum framework document such as discussed earlier.) Then the teacher must think of a handful of specific examples or behavioral indicators for each goal— just a half dozen or so of these as well. The behavioral indicators clarify the meaning of the general goal, but are not meant to be the only way that students might show success at learning. Then, at last, thoughtful planning for individual lessons or activities can begin. This approach works especially well for learning goals that are relatively long-term— goals that take many lessons, days, or weeks to reach. During such long periods of teaching, it is impossible to specify the exact, detailed behaviors that every student can or should display to prove that he or she has reached a general goal. It is possible, however, to specify general directions toward which all students should focus their learning and to explain the nature of the goals with a sample of well-chosen indicators or examples (Popham, 2002).

The cognitive, general-to-specific approach is reasonable on the face of it, and in fact probably describes how many teachers think about their instructional planning. But critics have argued that indicators used as examples may not in fact clarify the general goal enough; students therefore end up unexpectedly— as Casey Stengel said at the start of this chapter— "someplace else". Given the general goal of understanding photosynthesis described above, for example, how are we to know whether the five indicators that are listed really allow a teacher to grasp the full meaning of the goal? Put differently, how *else* might a student show understanding of photosynthesis, and how is a teacher to know that a student's achievement is s a legitimate display of understanding? To some educators, grasping the meaning of goals from indicators is not as obvious as it should be, and in any case is prone to misunderstanding. The solution, they say, is not to start planning with general goals, but with specific behaviors that identify students' success.

From specific to general: behavioral objectives

Compared to the cognitive approach, the behavioral approach to instructional planning reverses the steps in planning. Instead of starting with general goal statements accompanied by indicator examples, it starts with the identification of specific behaviors—

concrete actions or words— that students should perform or display as a result of instruction (Mager, 2005). Collectively, the specific behaviors may describe a more general educational goal, but unlike the indicators used in the cognitive approach, they are not a mere sampling of the possible specific outcomes. Instead they represent all the intended specific outcomes. Consider this sampling of behavioral objectives:

Objectives: Learning to use in-line roller blade skates (beginning level)

1. Student ties boots on correctly.
2. Student puts on safety gear correctly, including helmet, knee and elbow pads.
3. Student skates 15 meters on level ground without falling.
4. Student stops on demand within a three meter distance, without falling.

The objectives listed are not merely a representative sample of how students can demonstrate success with roller-blading. Instead they are behaviors that every student should acquire in order to meet the goal of using roller blades as a beginner. There simply are no other ways to display learning of this goal; getting 100 per cent on a written test about roller blading, for example, would not qualify as success with this goal, though it might show success at some other goal, such as verbal knowledge about roller blading. Even adding other skating behaviors (like "Student skates backwards" or "Student skates in circles") might not qualify as success with this particular goal, because it could reasonably be argued that the additional skating behaviors are about skating at an advanced level, not a beginning level.

In the most commonly used version of this approach, originated by Robert Mager (1962, 2005), a good behavioral objective should have three features. First, it should specify a behavior that can in fact be observed. In practice this usually means identifying something that a student does or says, not something a student thinks or feels. Compare the following examples; the one on the left names a behavior to be performed, but the one on the right names a thinking process that cannot, in principle, be seen:

Behavioral objective	Not behavioral object
The student will make a list of animal species that live in the water but breathe air and a separate list of species that live in the water but do not require air to breathe.	The student will understand the difference between fish and mammals that live in the water,

The second feature of a good behavioral objective is that it describes conditions of performance of the behavior. What are the special circumstances to be provided when the student performs the objective? Consider these two examples:

Special condition of performance is specified	A special condition of performance is not
Given a list of 50 species, the student will circle those that live in water but breathe air and underline those that live in water but do not breathe air.	After three days of instruction, the student will identify species that live in water but breathe air, as well as species that live in water but do not breathe air.

The objective on the left names a special condition of performance— that the student will be given a particular kind of list to work from— which is not part of the instruction itself. The objective on the right appears to name a condition— "three days of instruction". But the condition really describes what the teacher will do (she will instruct), not something specific to students' performance.

The third feature of a good behavioral objective is that it specifies a minimum level or degree of acceptable performance. Consider these two examples:

Specifies minimum level	Does not specify minimum level
Given a list of 50 species, the student will circle all of those that live in water but breathe air and underline all of those that live in water but do not breathe air. The student will do so within fifteen minutes.	The student will circle names of species that live in water but breathe air and underline those that live in water but do not breathe air.

The objective on the left specifies a level of performance— 100 per cent accuracy within 15 minutes. The objective on the right leaves this information out (and incidentally it also omits the condition of performance mentioned on the left).

Behavioral objectives have obvious advantages because of their clarity and precision. They seem especially well suited for learning that by their nature they can be spelled out explicitly and fully, such as when a student is learning to drive a car, to use safety equipment in a science laboratory, or install and run a particular computer program. Most of these goals, as it happens, also tend to have relatively short learning cycles, meaning that they can be learned as a result of just one lesson or activity, or of just a short series of them at most. Such goals tend not to include the larger, more abstract goals of education. In practice, both kinds of goals—the general and the specific- form a large part of education at all grade levels.

Finding the best in both approaches

When it comes to teaching and learning the large or major goals, then, behavioral objectives can seem unwieldy. How, a teacher might ask, can you spell out all of the behaviors involved in a general goal like *becoming a good citizen*? How could you name in advance the numerous conditions under which good citizenship might be displayed, or the minimum acceptable level of good citizenship expected in each condition? Specifying these features seems impractical at best, and at times even undesirable ethically or philosophically. (Would we really want any students to become "minimum citizens"?) Because of these considerations, many teachers find it sensible to compromise between the cognitive and behavioral approaches. Here are some features that are often part of a compromise:

- When planning, think about BOTH long-term, general goals AND short-term, immediate objectives. A thorough, balanced look at most school curricula shows that they are concerned with the general as well as the specific. In teaching elementary math, for example, you may want students to learn general problem solving strategies (a general goal), but you may also want them to learn specific math facts (a specific objective). In teaching Shakespeare's plays in high school, you may want students to be able to compare the plays critically (a general goal), but doing so may require that they learn details about the characters and plots of the major plays (a specific objective). Since general goals usually take longer to reach than specific objectives, instructional planning has to include both time frames.
- Plan for what students do, not what the teacher does. This idea may seem obvious, but it is easy to overlook it when devising lesson plans. Consider that example again about teaching Shakespeare. If you want students to learn the details about Shakespeare's plays, it is tempting to plan objectives like "Summarize the plot of each play to students", or "Write and hand out to students an outline of the plays". Unfortunately these objectives describe only what the teacher does, and makes the assumption (often unwarranted) that students will remember what the teacher says or puts in writing for them. A better version of the same objective should focus on the actions of students, not of teachers— for example, "Students will write a summary, from memory, of each of the major plays of Shakespeare". This version focuses on what students do instead of what the teacher does. (Of course you may still have to devise activities that help students to reach the objective, such as providing guided practice in writing summaries of plays.)
- To insure diversity of goals and objectives when planning, consider organizing goals and objectives by using a systematic classification scheme of educational objectives. At the beginning of this section we stated that there is a need, when devising goals and objectives, for both the specific and the general. Actually a more accurate statement is that there is a need for goals and objectives that refer to a variety of cognitive processes and that have varying degrees of specificity or generality. One widely used classification scheme that does so, for example, is one proposed 50 years ago by Benjamin Bloom (1956) and revised recently by his associates (Anderson & Krathwohl, 2001). We describe this system, called a taxonomy of objectives, in the next section.

Taxonomies of Educational Objectives

When educators have proposed taxonomies of educational objectives, they have tended to focus on one of three areas or domains of psychological functioning: either students' cognition (thought), students' feelings and emotions (affect), or students' physical skills (psychomotor abilities). Of these three areas, they have tended to focus the most attention on cognition. The taxonomy originated by Benjamin Bloom, for example, deals entirely with cognitive outcomes of instruction.

Bloom's Taxonomy

In its original form, **Bloom's Taxonomy** of educational objectives referred to forms of cognition or thinking, which were divided into the six levels (Bloom, et al., 1956). Table 31 summarizes the levels, and offers two kinds of examples— simple ones based on the children's story, *Goldilocks and the Three Bears*, and complex ones more typical of goals and objectives used in classrooms. The levels form a loose hierarchy from simple to complex thinking, at least when applied to some subjects and topics. When planning for these subjects it can therefore be helpful not only for insuring diversity among learning objectives, but also for sequencing materials. In learning about geography, for example, it may sometimes make sense to begin with information about specific places or societies (knowledge and comprehension), and work gradually toward comparisons and assessments among the places or societies (analysis and synthesis).

Table **Lesson4.2.1**: Bloom's Taxonomy of Objectives: cognitive domain

Type or level of learning	Simple example	Classroom example
Knowledge: recall of information, whether it is simple or complex in nature	"Name three things that Goldilocks did in the house of the three bears."	"List all of the planets of the solar system." "State five key features of life in the middle ages."
Comprehension: grasping the meaning of information, by interpreting it or translating it from one form to another	"Explain why Goldilocks preferred the little bear's chair."	"Convert the following arithmetic word problem to a mathematical equation." "Describe how plants contribute to the welfare of animal life."
Application: using information in new, concrete situations	"Predict some of the things Goldilocks might have used if she had entered your house."	"Illustrate how positive reinforcement might affect the behavior of a pet dog." "Use examples from the plot to illustrate the theme of novel."
Analysis: breaking information into its components to understand its structure	"Select the part of <i>Goldilocks and the Three Bears</i> where you think Goldilocks felt most comfortable."	"Compare the behavior of domestic dogs with the behavior of wolves." "Diagram the effects of weather patterns on plant metabolism."
Synthesis: putting parts of information together into a coherent whole	"Tell how the story would have been different if it had been three fishes."	"Design an experiment to test the effects of gravity on root growth." "Write an account of how humans would be different if life had originated on Mars instead of Earth."
Evaluation: judging the value of information for a particular purpose	"Justify this statement: <i>Goldilocks was a bad girl.</i> "	"Appraise the relevance of the novel for modern life." "Assess the value of information processing theory for planning instruction."

Such a sequence does not work well, however, for all possible topics or subjects. To learn certain topics in mathematics, for example, students may sometimes need to start with general ideas (like "What does it mean to multiply?") than with specific facts (like "How much is 4×6 ?") (Egan, 2005). At other times, though, the reverse sequence may be preferable. Whatever the case, a taxonomy of cognitive objectives, like Bloom's, can help to remind teachers to set a variety of objectives and to avoid relying excessively on just one level, such as simple recall of factual knowledge (Notar, et al., 2004).

Bloom's Taxonomy revised

A few years ago two of Benjamin Bloom's original colleagues, Linda Anderson and David Krathwohl, revised his taxonomy so as to clarify its terms and to make it more complete (Anderson & Krathwohl, 2001; Marzano, 2006). The resulting categories are summarized and compared to the original categories in Table 32. As the chart shows, several categories of objectives have been renamed and a second dimension added that describes the kind of thinking or cognitive processing that may occur. The result is a

much richer taxonomy than before, since every level of the objectives can now take four different forms. *Remembering*, for example, can refer to four different kinds of memory: memory for facts, for concepts, for procedures, or for metacognitive knowledge. Table **Lesson4.2.2** gives examples of each of these kinds of memory.

Table **Lesson4.2.2** : Bloom's Taxonomy of cognitive objectives—revised

Original term from Bloom's Taxonomy (1956)	Revised term emphasizing cognitive processing (2001)	A new dimension added: types of knowledge learned (2001)	Example of cognitive process <i>remembering</i> combined with possible types of knowledge
Knowledge	Remembering	- factual knowledge - conceptual knowledge - procedural knowledge - metacognitive knowledge	Memory for facts: <i>recalling the names of each part of a living cell</i>
Comprehension	Understanding		
Application	Applying		Memory for concepts: <i>recalling the functions of each part of a living cell</i>
Analysis	Analyzing		
Evaluation	Evaluating		Memory for procedures: <i>recalling how to view a cell under a microscope</i>
Synthesis	Creating		Memory for metacognition: <i>recalling not the names of the parts, but a <i>technique</i> for remembering the names of the parts of a living cell</i>

Caption: The revision to Bloom's Taxonomy distinguishes between cognitive processes (left-hand column in the table) and types of knowledge learned (right-hand column). The original version has terms similar to the cognitive processing terms in the revised version. According to the revised version, any type of knowledge (from the right-hand column) can, in principle, occur with any type of cognitive processing (left-hand column).

Taxonomies of affective objectives and psychomotor objectives

Although taxonomies related to *affect*, or the feelings and emotions of students, are used less commonly than cognitive taxonomies for planning instruction, various educators have constructed them. One of the most widely known was also published by colleagues of Benjamin Bloom and classifies affect according to how committed a student feels toward what he is learning (Krathwohl, Bloom, & Masia, 1964/1999). Table 33 summarizes the categories and gives brief examples. The lowest level, called *receiving*, simply involves willingness to experience new knowledge or activities. Higher levels involve embracing or adopting experiences in ways that are increasingly organized and that represent increasingly stable forms of commitment.

Table **Lesson4.2.3** : Taxonomies of objectives: affective domain and psychomotor domain

Affective domain		Psychomotor domain	
Receiving	Willingness to attend to particular experience	Imitation	Repeating a simple action that has been demonstrated
Responding	Willingness to participate actively in an experience	Manipulation	Practice of an action that has been imitated but only learned partially
Valuing	Perception of experience as worthwhile	Precision	Quick, smooth execution of an action that has been practiced
Organization	Coordination of valued experiences into partially coherent wholes	Articulation	Execution of an action not only with precision, but also with modifications appropriate to new circumstances
Characterization by a value complex	Coordination of valued experiences and of organized sets of experiences into a single comprehensive value hierarchy	Naturalization	Incorporation of an action into the motor repertoire, along with experimentation with new motor actions

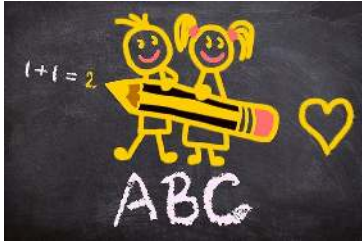
Taxonomies related to abilities and skills that are physical, or psychomotor, have also been used less widely than affective taxonomies, with the notable exception of one area of teaching where they are obviously relevant: physical education. As you might expect, taxonomic categories of motor skills extend from simple, brief actions to complex, extended action sequences that combine simpler, previously learned skills smoothly and automatically (Harrow, 1972; Simpson, 1972). One such classification scheme is shown in Table 33. An example of a very basic psychomotor skill might be imitating the action of throwing a ball when modeled by someone else; an example of the latter might be performing a 10 minute gymnastics routine which the student has devised for himself or herself. Note, though, that many examples of psychomotor skills also exist outside the realm of physical education. In a science course, for example, a student might need to learn to operate laboratory equipment that requires using delicate, fine movements. In art classes, students might learn to draw, and in music they might learn to play an instrument (both are partly motor skills). Most first graders are challenged by the motor skills of learning to write. For students with certain physical disabilities, furthermore, motor skill development is an important priority for the student's entire education.

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5: Key Practices in Instruction

Teacher Education through School based Support (TESS)-India



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Content

1. Planning lessons
 2. Involving all
 3. Talk for learning
 4. Using pair work
 5. Using questioning to promote thinking
 6. Monitoring and giving feedback
 7. Using group work
 8. Storytelling, songs, and more
 9. Assessing progress and performance
-

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Lesson 5.1: Planning Lessons

1. Planning lessons

Why planning and preparing are important

- being clear about what your students need in order to make progress
 - deciding how you are going to teach in a way that students will understand and how to maintain flexibility to respond to what you find
 - looking back on how well the lesson went and what your students have learned in order to plan for the future
-

Planning a unit of lessons

- what you want the students to learn
 - how you will introduce that learning
 - what students will have to do and why
-

Preparing individual lessons

1 – The introduction

2 – The main part of the lesson

3 – The end of the lesson to check on learning

Reviewing lessons

- change or vary the activities
- prepare a range of open and closed questions
- have a follow-up session with students who need extra support

respond flexibly to what you find out about your students' actual learning.

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Lesson 5.2: Involving all

2. Involving all

What does it mean to 'involve all'?



Three key principles to ensure you involve all in learning

- **Noticing:** Effective teachers are observant, perceptive and sensitive; they notice changes in their students. If you are observant, you will notice when a student does something well, when they need help and how they relate to others. You may also perceive changes in your students, which might reflect changes in their home circumstances or other issues. Involving all requires that you notice your students on a daily basis, paying particular attention to students who may feel marginalized or unable to participate.
- **Focus on self-esteem:** Good citizens are the ones who are comfortable with who they are. They have self-esteem, know their own strengths and weaknesses, and have the ability to form positive relationships with other people, regardless of background. They respect themselves and they respect others. As a teacher, you can have a significant impact on a young person's self-esteem; be aware of that power and use it to build the self-esteem of every student.
- **Flexibility:** If something is not working in your classroom for specific students, groups or individuals, be prepared to change your plans or stop an activity. Being flexible will enable you to make adjustments so that you involve all students more effectively.

Approaches you can use all the time

- **Modeling good behavior:** **Be an example to your students** by treating them all well, regardless of ethnic group, religion or gender. Treat all students with respect and make it clear through your teaching that you value all students equally. Talk to them all respectfully, take account of their opinions when appropriate and encourage them to take responsibility for the classroom by taking on tasks that will benefit everyone.
- **High expectations:** **Ability is not fixed;** all students can learn and progress if supported appropriately. If a student finds it difficult to understand the work you are doing in class, then do not assume that they cannot ever understand. Your role as the teacher is to work out how best to help each student learn. If you have high expectations of everyone in your class, your students are more likely to assume that they will learn if they persevere. High expectations should also apply to behavior. Make sure the expectations are clear and that students treat each other with respect.
- **Build variety into your teaching:** **Students learn in different ways.** Some students like to write; others prefer to draw mind maps or pictures to represent their ideas. Some students are good listeners; some learn best when they get the opportunity to talk about their ideas. You cannot suit all the students all the time, but you can build variety into your teaching and offer students a choice about some of the learning activities that they undertake.
- **Relate the learning to everyday life:** For some students, what you are asking them to learn appears to be irrelevant to their everyday lives. You can address this by making sure that whenever possible, you **relate the learning to a context that is relevant** to them and that you draw on examples from their own experience.
- **Use of language:** **Think carefully about the language you use.** Use positive language and praise, and do not ridicule students. Always comment on their behavior and not on them. 'You are annoying me today' is very personal and can be better expressed as 'I am finding your behavior annoying today' or 'Is there any reason you are finding it difficult to concentrate?', which is much more helpful.
- **Challenge stereotypes:** Find and use resources that show girls in non-stereotypical roles or invite female role models to visit the school, such as scientists. Try to be aware of your own gender stereotyping; you may know that girls play sports and that boys are caring, but often we express this differently, mainly because that is the way we are used to talking in society.
- **Create a safe, welcoming learning environment:** All students need to feel safe and welcome at school. You are in a position to make your students feel welcome by encouraging mutually respectful and friendly behavior from everyone. Think about how the school and classroom might appear and feel like to different students. Think about where they should be asked to sit and make sure that any students with visual or hearing impairments, or physical disabilities, sit where they can access the lesson. Check that those who are shy or easily distracted are where you can easily include them.

Specific teaching approaches

involve all students. These are described in more detail in other chapters, but a brief introduction is given here:

- *Questioning:* If you invite students to put their hands up, the same people tend to answer. There are other ways to involve more students in thinking about the answers and responding to questions. You can direct questions to specific people. Tell the class you will decide who answers, then ask people at the back and sides of the room, rather than those sitting at the front. Give students ‘thinking time’ and invite contributions from specific people. Use pair or group work to build confidence so that you can involve everyone in whole-class discussions.
- *Assessment:* Develop a range of techniques for formative assessment that will help you to know each student well. You need to be creative to uncover hidden talents and shortfalls. Formative assessment will give you accurate information rather than assumptions that can easily be drawn from generalized views about certain students and their abilities. You will then be in a good position to respond to their individual needs.
- *Group work and pair work:* Think carefully about how to divide your class into groups or how to make up pairs, taking account of the goal to include all and encourage students to value each other. Ensure that all students have the opportunity to learn from each other and build their confidence in what they know. Some students will have the confidence to express their ideas and ask questions in a small group, but not in front of the whole class.
- *Differentiation:* Setting different tasks for different groups will help students start from where they are and move forward. Setting open-ended tasks will give all students the opportunity to succeed. Offering students, a choice of task helps them to feel ownership of their work and to take responsibility for their own learning. Taking account of individual learning needs is difficult, especially in a large class, but by using a variety of tasks and activities it can be done.

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Lesson 5.3: Talk for Learning and Pair Work

3. Talk for learning

Why talk for learning is important

- those ideas are explored
 - reasoning is developed and organized as such, so students learn more
-

Planning talk for learning activities in the classroom

Building on students' talk

- listen to what students say
 - appreciate and build on students' ideas
 - encourage the students to take it further
-

Encourage students to ask questions themselves

- entitle a section of your lesson 'Hands up if you have a question'
 - put a student in the hot-seat and encourage the other students to question that student as if they were a character, e.g. Pythagoras or Mirabai
 - play a 'Tell Me More' game in pairs or small groups
 - give students a question grid with who/what/where/when/why questions to practice basic inquiry
 - give the students some data (such as the data available from the World Data Bank, e.g. the percentage of children in full-time education or exclusive breastfeeding rates for different countries), and ask them to think of questions you could ask about this data design a question wall listing the students' questions of the week.
-

4. Using pair work

Why use pair work?

Tasks for pair work

Pair work tasks could include:

- *'Think-pair-share'*: Students think about a problem or issue themselves and then work in pairs to work out possible answers before sharing their answers with other students. This could be used for spelling, working through calculations, putting things in categories or in order, giving different viewpoints, pretending to be characters from a story, and so on.
- *Sharing information*: Half the class is given information on one aspect of a topic; the other half is given information on a different aspect of the topic. They then work in pairs to share their information in order to solve a problem or come to a decision.
- *Practicing skills such as listening*: One student could read a story and the other, ask questions; one student could read a passage in English, while the other tries to write it down; one student could describe a picture or diagram while the other student tries to draw it based on the description.
- *Following instructions*: One student could read instructions for the other student to complete a task.
- *Storytelling or role play*: Students could work in pairs to create a story or a piece of dialogue in a language that they are learning

Managing pairs to include all

- Manage the pairs that the students work in. Sometimes students will work in friendship pairs; sometimes they will not. Make sure they understand that you will decide the pairs to help them maximize their learning.
- To create more of a challenge, sometimes you could pair students of mixed ability and different languages together so that they can help each other; at other times, you could pair students working at the same level.
- Keep records so that you know your students' abilities and can pair them together accordingly.

- At the start, explain the benefits of pair work to the students, using examples from family and community contexts where people collaborate.
- Keep initial tasks, brief and clear.
- Monitor the student pairs to make sure that they are working as you want.
- Give students roles or responsibilities in their pair, such as two characters from a story, or simple labels such as '1' and '2', or 'As' and 'Bs'). Do this before they move to face each other so that they listen.
- Make sure that students can turn or move easily to sit facing each other.

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Lesson 5.4: Using Questions

5. Using questioning to promote thinking

Of the questions posed, 60 percent recalled facts and 20 per cent were procedural (Hattie, 2012), with most answers being either right or wrong. But does simply asking questions that are either right or wrong promote learning?

- Guide students toward understanding when a new topic or material is introduced
- Push students to do a greater share of their thinking
- Remediate an error
- Stretch students
- Check for understanding.

Questioning is generally used to find out what students know, so it is important in assessing their progress. Questions can also be used to inspire, extend students' thinking skills and develop inquiring minds. They can be divided into two broad categories:

- **Lower-order questions**, which involve the recall of facts and knowledge previously taught, often involving closed questions (a yes or no answer).
- **Higher-order questions**, which require more thinking. They may ask the students to put together information previously learnt to form an answer or to support an argument in a logical manner. Higher-order questions are often more open-ended.

Open-ended questions encourage students to think beyond textbook-based, literal answers, thus eliciting a range of responses. They also help the teacher to assess the students' understanding of content.

Encouraging students to respond

- the length of students' responses
- the number of students offering responses
- the frequency of students' questions
- the number of responses from less capable students
- positive interactions between students.



Your response matters

- Pick out the parts of the answers that are correct and ask the student in a supportive way to think a bit more about their answer. This encourages more active participation and helps your students to learn from their mistakes. The following comment shows how you might respond to an incorrect answer in a supportive way: 'You were right about evaporation forming clouds, but I think we need to explore a bit more about what you said about rain. Can anyone else offer some ideas?'
- Write on the blackboard all the answers that the students give, and then ask the students to think about them all. What answers do they think are right? What might have led to another answer being given? This gives you an opportunity to understand the way that your students are thinking and also gives your students an unthreatening way to correct any misconceptions that they may have.

Value all responses by listening carefully and asking the student to explain further. If you ask for further explanation for all answers, right or wrong, students will often correct any mistakes for themselves, you will develop a thinking classroom and you will really know what learning your students have done and how to proceed. If the wrong answers result in humiliation or punishment, then your students will stop trying for fear of further embarrassment or ridicule.

Improving the quality of responses

- a how or a why
 - another way to answer
 - a better word
 - evidence to substantiate an answer
 - integration of a related skill
 - application of the same skill or logic in a new setting.
- **Prompting** requires appropriate hints to be given – ones that help students develop and improve their answers. You might first choose to say what is right in the answer and then offer information, further questions and other clues. (‘So what would happen if you added a weight to the end of your paper airplane?’)
 - **Probing** is about trying to find out more, helping students to clarify what they are trying to say to improve a disorganized answer or one that is partly right. (‘So what more can you tell me about how this fits together?’)
 - **Refocusing** is about building on correct answers to link students’ knowledge to the knowledge that they have previously learned. This broadens their understanding. (‘What you have said is correct, but how does it link with what we were looking at last week in our local environment topic?’)
 - **Sequencing questions** means asking questions in an order designed to extend thinking. Questions should lead students to summarize, compare, explain or analyze. Prepare questions that stretch students, but do not challenge them so far that they lose the meaning of the questions. (‘Explain how you overcame your earlier problem. What difference did that make? What do you think you need to tackle next?’)
 - **Listening** enables you to not just look for the answer you are expecting, but to alert you to unusual or innovative answers that you may not have expected. It also shows that you value the students’ thinking and therefore they are more likely to give thoughtful responses. Such answers could highlight misconceptions that need correcting, or they may show a new approach that you had not considered. (‘I hadn’t thought of that. Tell me more about why you think that way.’)

Remember, questioning is not about what the teacher knows, but about what the students know. It is important to remember that you should never answer your own questions! After all, if the students know you will give them the answers after a few seconds of silence, what is their incentive to answer?

www.tes.co.uk/article.aspx?storycode=381755 (accessed 22 September 2014).

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Lesson 5.5: Monitoring and Giving Feedback

6. Monitoring and Giving Feedback

Monitoring

- be more aware of their performance and more responsible for their learning
 - improve their learning
 - predict achievement on state and local standardized tests
 - achieve higher grades
 - when to ask a question, or give a prompt
 - when to praise
 - whether to challenge
 - how to include different groups of students in a task what to do about mistakes
-

Listening to and observing students

- listen to your students reading aloud
 - Listen to discussions in pair or group work
 - observe students using resources outdoors or in the classroom observe the body language of groups as they work
-

Giving feedback

- information about what happened
 - an evaluation of how well the action or task was performed guidance as to how their performance can be improved
 - what they can actually do
 - what they cannot do yet
 - how their work compares with that of others how they can improve
 - focused on the task being undertaken and the learning that the student needs to do
 - clear and honest, telling the student what is good about their learning as well as what requires improvement
 - actionable, telling the student to do something that they are able to do
 - given in appropriate language that the student can understand
 - given at the right time – if it's given too soon, the student will think 'I was just going to do that!'; too late, and the student's focus will have moved elsewhere and they will not want to go back and do what is asked.
-

Using praise and positive language



Using praise and positive language

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Lesson 5.6: Using Group Work

7. Using Group Work (aka Cooperative Learning)

The benefits of group work

Planning group work

- the goals and expected outcomes of the group activity
 - the time allocated to the activity, including any feedback or summary task
 - how to split the groups (how many groups, how many students in each group, criteria for groups)
 - how to organize the groups (role of different group members, time required, materials, recording and reporting)
 - how any assessment will be undertaken and recorded (take care to distinguish individual assessments from group assessments)
 - how you will monitor the groups' activities
-

Groupwork tasks

- **Presentations:** Students work in groups to prepare a presentation for the rest of the class. This works best if each group has a different aspect of the topic, so they are motivated to listen to each other rather than listening to the same topic several times. Be very strict about the time that each group has to present and decide on a set of criteria for a good presentation. Write these on the board before the lesson. Students can use the criteria to plan their presentation and assess each other's work. The criteria could include:
 - Was the presentation clear?
 - Was the presentation well-structured?
 - Did I learn something from the presentation?
 - Did the presentation make me think?
 - **Problem solving:** Students work in groups to solve a problem or a series of problems. This could include conducting an experiment in science, solving problems in mathematics, analyzing a story or poem in English, or analyzing evidence in history.
 - **Creating an artifact or product:** Students work in groups to develop a story, a piece of drama, a piece of music, a model to explain a concept, a news report on an issue or a poster to summarize information or explain a concept. Giving groups five minutes at the start of a new topic to create a brainstorm or mind map will tell you a great deal about what they already know, and will help you pitch the lesson at an appropriate level.
 - **Differentiated tasks:** Group work is an opportunity to allow students of different ages or attainment levels to work together on an appropriate task. Higher attainers can benefit from the opportunity to explain the work, whereas lower attainers may find it easier to ask questions in a group than in a class, and will learn from their classmates.
 - **Discussion:** Students consider an issue and come to a conclusion. This may require quite a bit of preparation on your part in order to make sure that the students have enough knowledge to consider different options, but organizing a discussion or debate can be very rewarding for both you and them.
-

Organizing groups

- Decide how and why you will divide students into groups; for example, you may divide groups by friendship, interest or by similar or mixed attainment. Experiment with different ways and review what works best with each class.
 - Plan any roles you will give to group members (for example, note taker, spokesperson, timekeeper or collector of equipment), and how you will make this clear.
-

Managing group work

- Direct your students to the groups they will work on according to your plan, perhaps designating areas in the classroom where they will work or giving instructions about moving any furniture or school bags
- Be very clear about the task and write it on the board in short instructions or pictures. Allow your students to ask questions before you start.

- **‘Expert groups’**: Give each group a different task, such as researching one way of generating electricity or developing a character for a drama. After a suitable time, re-organize the groups so that each new group is made up of one ‘expert’ from all the original groups. Then give them a task that involves collating knowledge from all the experts, such as deciding on what sort of power station to build or preparing a piece of drama.
- **‘Envoys’**: If the task involves creating something or solving a problem, after a while, ask each group to send an envoy to another group. They could compare ideas or solutions to the problem and then report back to their own group. In this way, groups can learn from each other.
- are resistant to active learning and do not engage
- are dominant
- do not participate due to poor interpersonal skills or lack of confidence

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Lesson 5.7: Storytelling, Songs, and More

8. Storytelling, Songs, and More

Storytelling

- be entertaining, exciting and stimulating
 - take us from everyday life into fantasy worlds
 - be challenging
 - stimulate thinking about new ideas
 - help explore feelings
 - help to think through problems in a context that is detached from reality and therefore less threatening
-

Songs

Role play

- explores real-life situations to develop understandings of other people's feelings
 - promotes development of decision making skills
 - actively engages students in learning and enables all students to make a contribution
 - promotes a higher level of thinking.
-

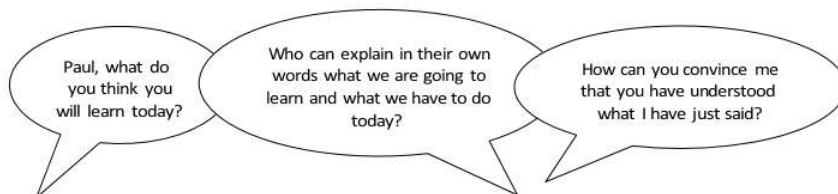
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Lesson 5.8: Assessing Progress and Performance

9. Assessing Progress and Performance

- Summative assessment looks back and makes a judgment on what has already been learnt. It is often conducted in the form of tests that are graded, telling students their attainment on the questions in that test. This also helps in reporting outcomes.
 - Formative assessment (or assessment for learning) is quite different, being more informal and diagnostic in nature. Teachers use it as part of the learning process, for example questioning to check whether students have understood something. The outcomes of this assessment are then used to change the next learning experience. Monitoring and feedback are part of formative assessment.
 - Understand what they are expected to learn
 - Know where they are now with that learning
 - Understand how they can make progress (that is, what to study and how to study) and know when they have reached the goals and expected outcomes.
 - Before: Assessing before the teaching begins can help you identify what the students know and can do prior to instruction. It determines the baseline and gives you a starting point for planning your teaching. Enhancing your understanding of what your students know reduces the chance of reteaching the students something they have already mastered or omitting something they possibly should (but do not yet) know or understand.
 - During: Assessing during classroom teaching involves checking if students are learning and improving. This will help you make adjustments in your teaching methodology, resources and activities. It will help you understand how the student is progressing towards the desired objective and how successful your teaching is.
 - After: Assessment that occurs after teaching confirms what students have learnt and shows you who has learnt and who still needs support. This will allow you to assess the effectiveness of your teaching goal.
-

Before: being clear about what your students will learn



Before: knowing where students are in their learning

- Ask the students to work in pairs to make a mind map or list of what they already know about that topic, giving them enough time to complete it but not too long for those with few ideas. You should then review the mind maps or lists.
 - Write the important vocabulary on the board and ask for volunteers to say what they know about each word. Then ask the rest of the class to put their thumbs up if they understand the word, thumbs down if they know very little or nothing, and thumbs horizontal if they know something.
-

During: ensuring students' progress in learning

- helping students know their strengths and how they might further improve
 - being clear about what needs further development
 - being positive about how they might develop their learning, checking that they understand and feel able to use the advice.
 - go back over some work that you thought they knew already
 - group students according to needs, giving them differentiated tasks
 - encourage students to decide for themselves which of several resources they need to study so that they can 'fill their own gap'
 - use 'low entry, high ceiling' tasks so that all students can make progress – these are designed so that all students can start the task but the more able ones are not restricted and can progress to extend their learning.
-

After: collecting and interpreting evidence, and planning ahead

- find out how well your students are doing
- use this to inform your planning for the next lesson
- feed it back to students

Collecting information or evidence

- Collect information from a variety of sources – from your own experience, the student, other students, other teachers, parents and community members.
- Assess students individually, in pairs and in groups, and promote self-assessment. Using different methods is important, as no single method can provide all the information you need. Different ways of collecting information about the students' learning and progress include observing, listening, discussing topics and themes, and reviewing written class and homework.

Recording

- noting down what you observe while teaching–learning is going on in a diary/notebook/register
- keeping samples of students' work (written, art, craft, projects, poems, etc.) in a portfolio
- preparing every student's profile
- noting down any unusual incidents, changes, problems, strengths and learning evidences of students

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CHAPTER OVERVIEW

6: Assessment

Using assessment to advance students' learning not just check on learning requires viewing assessment as a process that is integral to the all phases of teaching including planning, classroom interactions and instruction, communication with parents, and self-reflection (Stiggins, 2002). Essential steps in assessment for learning include:

Step 1 : Having clear instructional goals and communicating them to students

In the previous chapter we documented the importance of teachers thinking carefully about the purposes of each lesson and unit. This may be hard for beginning teachers. For example, Vanessa, a middle school social studies teacher, might say that the goal of her next unit is: "Students will learn about the Civil War." Clearer goals require that Vanessa decides what it is about the US Civil War she wants her students to learn, e.g. the dates and names of battles, the causes of the US Civil War, the differing perspectives of those living in the North and the South, or the day-to-day experiences of soldiers fighting in the war. Vanessa cannot devise appropriate assessments of her students' learning about the US Civil War until she is clear about her own purposes.

For effective teaching Vanessa also needs to communicate clearly the goals and objectives to her students so they know what is important for them to learn. No matter how thorough a teacher's planning has been, if students do not know what they are supposed to learn they will not learn as much. Because communication is so important to teachers a specific chapter is devoted to this topic (Chapter 8), and so communication is not considered in any detail in this chapter.

Step 2: Selecting appropriate assessment techniques

Selecting and administering assessment techniques that are appropriate for the goals of instruction as well as the developmental level of the students are crucial components of effective assessment for learning. Teachers need to know the characteristics of a wide variety of classroom assessment techniques and how these techniques can be adapted for various content, skills, and student characteristics. They also should understand the role reliability, validity, and the absence of bias should play in choosing and using assessment techniques. Much of this chapter focuses on this information.

Step 3: Using assessment to enhance motivation and confidence

Students' motivation and confidence is influenced by the type of assessment used as well as the feedback given about the assessment results. Consider, Samantha a college student who takes a history class in which the professor's lectures and text book focus on really interesting major themes. However, the assessments are all multiple choice tests that ask about facts and Samantha, who initially enjoys the classes and readings, becomes angry, loses confidence she can do well, and begins to spend less time on the class material. In contrast, some instructors have observed that that many students in educational psychology classes like the one you are now taking will work harder on assessments that are case studies rather than more traditional exams or essays. The type of feedback provided to students is also important and we elaborate on these ideas later in this chapter.

Step 4: Adjusting instruction based on information

An essential component of assessment for learning is that the teacher uses the information gained from assessment to adjust instruction. These adjustments occur in the middle of a lesson when a teacher may decide that students' responses to questions indicate sufficient understanding to introduce a new topic, or that her observations of students' behavior indicates that they do not understand the assignment and so need further explanation. Adjustments also occur when the teacher reflects on the instruction after the lesson is over and is planning for the next day. We provide examples of adjusting instruction in this chapter and consider teacher reflection in more detail in Appendix C.

Step 5: Communicating with parents and guardians

Students' learning and development is enhanced when teachers communicate with parents regularly about their children's performance. Teachers communicate with parents in a variety of ways including newsletters, telephone conversations, email,

school district websites and parent-teachers conferences. Effective communication requires that teachers can clearly explain the purpose and characteristics of the assessment as well as the meaning of students' performance. This requires a thorough knowledge of the types and purposes of teacher made and standardized assessments (this chapter and Chapter 12) and well as clear communication skills (Chapter 8).

We now consider each step in the process of assessment for learning in more detail. In order to be able to select and administer appropriate assessment techniques teachers need to know about the variety of techniques that can be used as well as what factors ensure that the assessment techniques are high quality. We begin by considering high quality assessments.

[Lesson 6.1: Assessment and Evaluation](#)

[Lesson 6.2: Formative and Summative Assessment](#)

[Lesson 6.3: More on Formative Assessment](#)

[Lesson 6.4: Validity](#)

[Lesson 6.5: Reliability](#)

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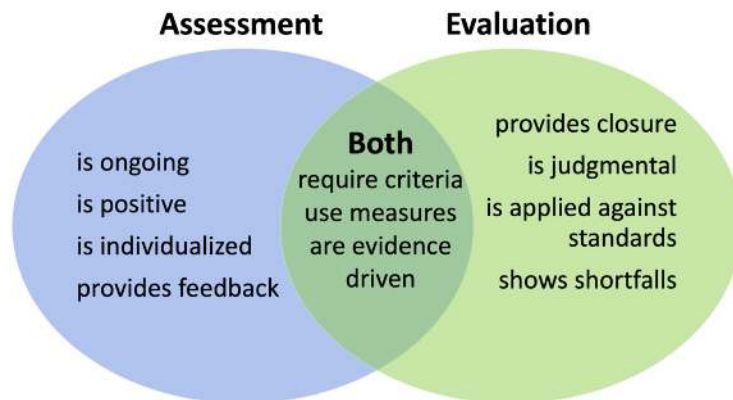
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Lesson 6.1: Assessment and Evaluation

Assessment, as defined by www.edglossary.org, “refers to the wide variety of methods or tools that educators use to evaluate, measure, and document the academic readiness, learning progress, skill acquisition, or educational needs of students.” It is analogous to evaluation, judgment, rating, appraisal, and analysis. (Great Schools Partnership, 2015)

Although the terms assessment and evaluation are often used synonymously, they are in fact distinctive and different. The intent of assessment is to measure effectiveness; evaluation adds a value component to the process. A teacher may assess a student to ascertain how well the individual successfully met the learning target. If, however, the measurement is used to determine program placement, for example with a special education program, honors club, or for Individual Educational Program documentation, the assessment constitutes an evaluation.



Goals of Assessment

Assessment is two-fold in nature. It enables the teacher to gather information and to then determine what the learner knows or does not know and concurrently drives the planning phase. In order to meet the needs of all learners, the teacher may need to differentiate the instruction.

The teacher is then responsible for providing positive feedback in a timely manner to the student. This feedback should include specifically whether the student met the learning target, specifically what needs to be improved upon, and who and how these goals will be met.

The intent of assessment has traditionally been to determine what the learner has learned. Today, the emphasis is on authentic assessment. While the former typically employed recall methods, the latter encourages learners to demonstrate greater comprehension. (Wiggins, 1990)

Methods to Assess

Within an academic setting, assessment may include “the process of observing learning; describing, collecting, recording, scoring, and interpreting information about a student’s or one’s own learning <http://www.k12.hi.us/atr/evaluation/glossary.htm>.”

It can occur by observations, interviews, tests, projects or any other information gathering method. Within the early childhood and early primary elementary grades, observations are used frequently to assess learners. Teachers may use a checklist to note areas of proficiency or readiness and may opt to use checkmarks or some other consistent means for record-keeping.



Another form of assessment in the early grades incorporates anecdotal records. These consist of narratives in which the teacher notes behaviors or abilities. Anecdotal records should be factual accounts, with interpretation clearly delineated.

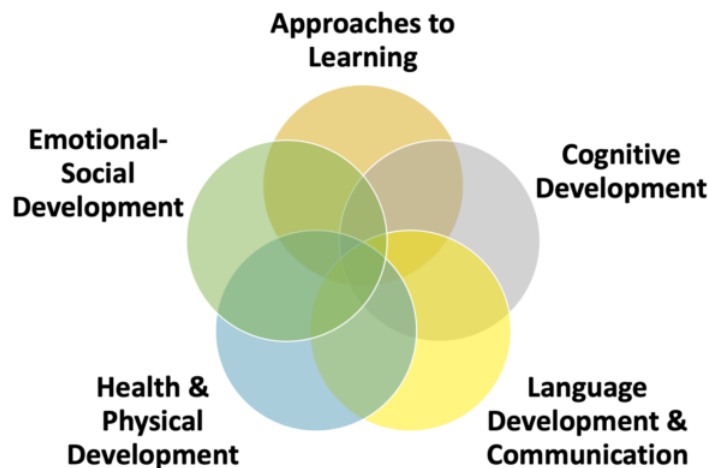
It is helpful for a teacher to include the date, day, and time. This record-keeping may result in emerging patterns. Does the learner exhibit certain behaviors or respond to learning activities because of proximity to lunchtime, or morning or afternoon? The aspect of understanding how individuals learn can be noted within the affective domain. (Kirk, N/D) This may influence how a student learns and behaves within a classroom setting. Seating, natural and artificial lighting, noise, and temperature all influence how a student feels and interacts within the environment and can have effect cognitive behaviors.

Interviews can be used on the elementary or secondary levels as an assessment tool. Like any other well- planned assessment tool, they necessitate careful planning and development of questions, positive rapport with the student, and an environment that is free from distractions, outside noise, and time constraints. Interviews may or may not be audiotaped or videotaped and scoring rubrics may be used to assess (Southerland, ND).

Tests offer yet another venue for assessment purposes. They may take the form of essay or short response, fill-in-the-blank, matching, or true or false formats. Like any of the other methods, they should be valid and reliable. Carefully thought out test questions need to be tied to learning standards and a clear and fair scoring measure needs to be in place.

Typically, assessment has been viewed as the result; the letter or point assigned at the end of an assignment; however, assessment can and should come at the beginning, end and throughout the teaching and learning process. While assessment should drive instruction, it often falls short when determining instructional decisions

5 Domains of Learning and Development



Scenario

Danielle Stein eagerly anticipated the upcoming parent-teacher conferences of the day. She had studied hard as a Childhood Education major and had worked diligently in her first year as a third-grade teacher at Maplewood Elementary School. Danielle had planned interdisciplinary lessons, employed inquiry-based learning centers, and met regularly with individual students to ensure that they had mastered the skills as determined by the state standards.

Each student had a portfolio filled with dated representations of their work. Ms. Stein understood the importance of specific and timely feedback and had painstakingly provided detailed written feedback on each work sample. She meticulously arranged the portfolios along with anecdotal notes and looked forward to sharing the accomplishments of the students with their family members.

As last-minute jitters began to set in, Danielle realized that she had no grades for any of the students. Despite doing all the right things, she had no way to assign a grade to any of the work the students had done. How would she respond when guardians asked what grade their child would earn on the first report card? How would she accurately tell them how they compared with their peers in reading? In math? In social studies and science?

Danielle quickly realized she was not as prepared as she had anticipated.

Reflection Question

What's the difference between assessment and evaluation?

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Lesson 6.2: Formative and Summative Assessment

Formative Assessment

Assessment should be designed to inform the teacher and learner in order to accommodate the needs of the learner. The **formative assessment** is one which occurs throughout a lesson or unit and may take a variety of forms. A teacher may determine what students know by question and answer formats, checklists, or by paper and pencil assignments. Likewise, games such as Kahoot and Jeopardy may assist in similar data collection. The informed teacher can utilize the results of the formative assessment to re-engage or to modify the teaching plans to meet the individual needs of the students.

Summative Assessment

The **summative assessment** is the evaluation that is given at the conclusion of a unit or lesson. It may determine student placement or level of knowledge and is often thought of as a grade determinant. Results of summative assessment are not used in lesson planning; rather, they are used to evaluate the mastery of material. It can take the form of a question and answer or paper and pencil approach like the formative assessment. Summative assessments also typically have one correct answer.

Formative Assessment	Both	Summative Assessment
They are assessments that we carry out to help inform the learning 'in the moment'. Formative assessment is continuous, informal and should have a central and pivotal role in every classroom. If used correctly, it will have a high impact on current learning and help you guide your instruction and teaching	Are ways to assess pupils. Must evaluate pupils effectively Are used for student feedback Assist in future lesson planning	There are different types of summative assessments that we carry out 'after the event,' often periodic (rather than continuous), and are often measured against a set standard. Summative assessment can be thought of as helping to validate and 'check' formative assessment – it is a periodic measure of how children are, overall, progressing in their mathematics learning.
Includes: • Quizzes • Talking in class • Creating diagrams or charts • Homework or classwork • Exit Surveys		Includes: • End of year assessments • Midterm or end-of-term exams • End of term portfolios • SATs

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Lesson 6.3: More on Formative Assessment

Faculty of Education., The Open Resource Bank for Interactive Teaching, and University of Cambridge

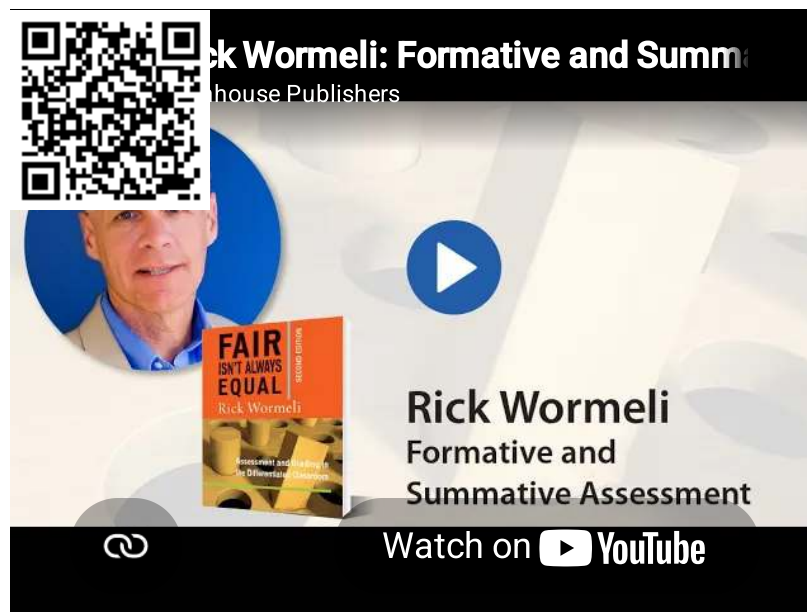
Assessment for learning (AfL)

Assessment for learning has been defined as the process of interpreting evidence to decide where learners are in their learning, where they need to go and how best to get there. When assessment for learning is well established in a classroom, students are actively involved in their learning; able to judge the success of their work and to take responsibility for their own progress

The notion of ‘assessment’ is often bound up with ideas regarding examinations, accreditation, perhaps even accountability. However, for some time there has been a growing discussion regarding ‘Assessment for Learning’ (AfL), or formative assessment. This form of assessment stands in contrast to summative assessment, which is understood to be the form of assessment most often conducted at the end of the unit, which is supposed to represent the understanding of that unit’s content at that point in time. Assessment for Learning, in contrast, is targeted at assessing understanding throughout teaching, helping students to understand what stage they are at, and how they might improve. AfL thus involves assessment to provide feedback for improving learning.

Rick Wormeli, author of *Fair Isn’t Always Equal* and *Differentiation*, explains the difference between the two and how formative assessment helps you offer better feedback to your students.

Click here to watch video (4:48 minutes) Rick Wormeli: Formative and Summative Assessment



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Stenhouse Publishers]. (2010, Nov. 30). Rick Wormeli: Formative and Summative Assessment. [Video File]. Retrieved from youtu.be/rJxFXjfB_B4Type your textbox content here.

Assessment for learning has been defined as:

The process of seeking and interpreting evidence for use by learners and their teachers to decide where the learners are in their learning, where they need to go and how best to get there.

Assessment for Learning: 10 Principles by the Assessment Reform Group, 2002, available from aaia.org.uk.

Click here to watch a video from Engage NY (2:36 minutes) **The Teacher provides feedback during and after instruction**

- The teacher's feedback to students is timely and based on high quality questions. The feedback helps guide students to a deeper understanding of the material and allows them to use that understanding to develop **alternate solutions**.



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The following key characteristics identify assessment for learning in practice.

Assessment for learning

- is embedded in a view of teaching and learning of which it is an essential part. Assessment for learning is not something extra or 'bolted on' that a teacher has to do. Student learning is the principal aim of schools and assessment for learning aims to provide students with the skills and strategies for taking the next steps in their learning;
- involves sharing learning goals with students. If students understand the main purposes of their learning and what they are aiming for, they are more likely to grasp what they need to do to achieve it;
- aims to help students to know and recognize the standards that they are aiming for. Learners need to be clear about exactly what they have to achieve in order to progress. They should have access to the criteria that will be used to judge this, and be shown examples or models where other learners have been successful. Students need to understand what counts as 'good work';
- involves students in peer and self-assessment. Ultimately, learners must be responsible for their own learning; the teacher cannot do that for them. So students must be actively involved in the process and need to be encouraged to see for themselves how they have progressed in their learning and what it is they need to do to improve. Teachers need to encourage students to review their work critically and constructively;
- provides feedback, which leads to students recognizing their next steps and how to take them. Feedback should be about the qualities of the work with specific advice on what needs to be done in order to improve. Students need to be given the time to act on advice and make decisions about their work, rather than being the passive recipients of teachers' judgements;
- involves both teacher and student in reviewing and reflecting on assessment data (information). Students need to have opportunities to communicate their evolving understanding and to act on the feedback they are given. The interaction between teacher and student is an important element of developing understanding and promoting learning;
- is underpinned by confidence that every student can improve. Poor feedback can lead to students believing that they lack 'ability' and are not able to learn. Students will only invest effort in a task if they believe they can achieve something. The expectation in the classroom needs to be that every student can make progress in his or her learning.

Assessment for learning: beyond the black box. University of Cambridge, Faculty of Education. ISBN: 0856030422. (Adapted from [Assessment for Learning Introduction](#), section What).

Assessment for Learning Research Summary and the references contained therein.

How might we use Assessment for Learning?

Key Characteristics of Assessment for Learning and Teaching Strategies

[Sharing learning objectives with students](#)

- Share learning objectives at the beginning of the lesson and, where appropriate, during the lesson, in language that students can understand
- Use these objectives as the basis for questioning and feedback during class discussions.
- Evaluate this feedback in relation to the achievement of the learning objectives to inform the next stages of planning.

Click here to watch Engage NY video (2:10 minutes) **Teacher communicates expectations for learning.**

purpose for the lesson or unit is clarified through a Q & A with the students.



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Helping students to know and recognize the standards they are aiming for

- Show students work that has met the criteria with explanations of why
- Give students clear success criteria and then relate them to the learning objectives
- Model what it should look like, for example, exemplify good writing on the board
- Ensure that there are clear, shared expectations about the presentation of work
- Provide displays of students' work which show work in progress as well as finished products

Click here to watch the Engage NY video (1:16 minutes) **Teacher communicates expectations for learning**

key vocabulary.



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Involving students in peer and self-assessment

- Give students clear opportunities to talk about what they have learned and what they have found difficult, using the learning objectives as a focus
- Encourage students to work/discuss together, focusing on how to improve
- Ask students to explain their thinking: 'How did you get that answer?'
- Give time for students to reflect upon their learning
- Identify with students the next steps in learning

Click here to watch this Video from Engage NY (3:18 minutes). **The teacher uses formative assessment to monitor and adjust pacing**



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[Providing feedback that leads students to recognizing their next steps and how to take them](#)

- Value oral as well as written feedback
- Ensure feedback is constructive as well as positive, identifying what the student has done well, what needs to be done to improve and how to do it
- Identify the next steps for groups and individuals as appropriate

Click here to watch Engage NY video (2:17 minutes) **The teacher provides feedback to students**
common rubric, and connects to specific examples from the students' work.



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[Promoting confidence that every student can improve](#)

- Identify small steps to enable students to see their progress, thus building confidence and self-esteem
- Encourage students to explain their thinking and reasoning within a secure classroom ethos

Involving both teacher and student in reviewing and reflecting on assessment information

- Reflect with students on their work, for example through a storyboard of steps taken during an investigation
- Choose appropriate tasks to provide quality information (with emphasis on process, not just the correct answer)
- Provide time for students to reflect on what they have learned and understood, and to identify where they still have difficulties
- Adjust planning, evaluate effectiveness of task, resources, etc. as a result of assessment

Assessment for Learning Introduction, section How).

Summary of the research

Assessment for learning

Highlights of research findings in this area include the following work

Inside the black box: raising standards through classroom assessment

Inside the black box: raising standards through classroom assessment is an influential pamphlet that summarizes the main findings arising from 250 assessment articles (covering nine years of international research) which were studied by Paul Black and Dylan Wiliam. The document is well known and widely used, and acts as a touchstone for many professionals in the field of assessment.

Assessment for learning: beyond the black box

- providing effective feedback to students;
- actively involving students in their own learning;
- adjusting teaching to take account of the results of assessment;
- recognizing the profound influence assessment has on the motivation and self-esteem of students, both of which are crucial to learning;
- considering the need for students to be able to assess themselves and to understand how to improve.

The research also identifies a number of risks with regard to assessment

- valuing quantity and presentation rather than the quality of learning;
- lowering the self-esteem of students by over-concentrating on judgements rather than advice for improvement;
- demoralizing students by comparing them negatively and repeatedly with more successful learners;
- giving feedback, which serves social and managerial purposes rather than helping students to learn more effectively;
- working with an insufficient picture of students' learning needs.

Working inside the black box: assessment for learning

Working inside the black box picks up where *Inside the black box* left off. It sets out its main findings under four headings:

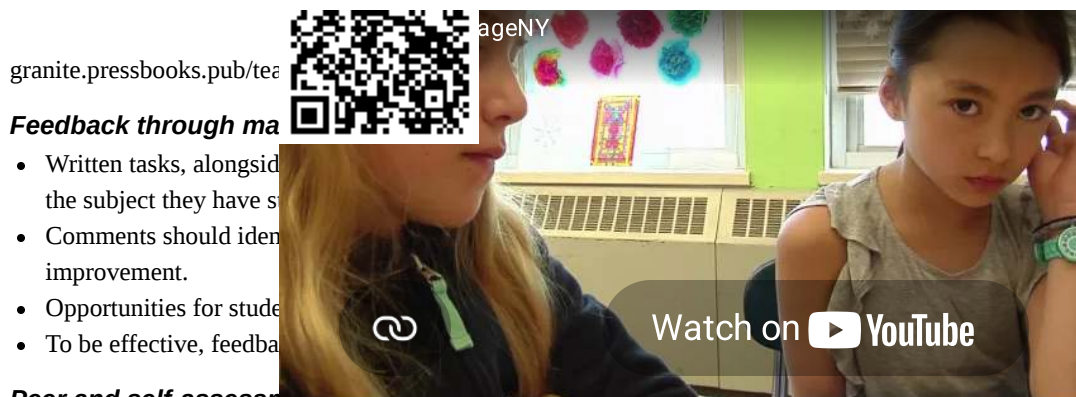
Questioning

- More effort has to be spent in framing questions that are worth asking.
- Wait time has to be increased to several seconds to give students time to think, and everyone should be expected to contribute to the discussion.
- Follow-up activities have to provide opportunities to ensure that meaningful interventions that extend students' understanding take place.
- The only point of asking questions is to raise issues about which the teacher needs information, or about which the students need to think.

Click here to watch the video from Engage NY (6:32 minutes) **The teacher uses a variety of questions**

teacher's questions are of high quality and asked with adequate time for students to respond. Students share a few of their own thoughts and questions.





Feedback through ma

- Written tasks, alongside the subject they have s
- Comments should identify improvement.
- Opportunities for student
- To be effective, feedback

ing of the key features of
nce on how to make that
process.

Peer and self-assessment

- The criteria for evaluating any learning achievements must be transparent to students to enable them to have a clear overview, both of the aims of their work and of what it means to complete it successfully.
- Students should be taught the habits and skills of collaboration in peer assessment.
- Students should be encouraged to keep in mind the aims of their work and to assess their own progress to meet these aims as they proceed.
- Peer and self-assessment make unique contributions to the development of students' learning – they secure aims that cannot be achieved in any other way.

The formative use of summative tests

- Students should be engaged in a reflective review of the work they have done to enable them to plan their revision effectively.
- Students should be encouraged to set questions and mark answers to help them, both to understand the assessment process and to focus further efforts for improvement.
- Students should be encouraged through peer and self-assessment to apply criteria to help them understand how their work might be improved.
- Summative tests should be, and should be seen to be, a positive part of the learning process.

The underlying issues are identified:

- **learning theory** (teachers need to know in advance what sort of feedback will be useful; they need to understand how their students learn);
- **subject differences** (teachers need to have an understanding of the fundamental principles of the subject, an understanding of the kinds of difficulty that students might have, and the creativity to think up questions which can stimulate productive thinking – such pedagogical content knowledge is essential in interpreting response);
- **motivation and self-esteem** (learning is not just a cognitive exercise: it involves the whole person – learning for learning rather than for rewards or grades);
- **a learning environment** – principles and plans (teachers need to have forethought of how to teach in a way which establishes a supportive climate);
- **a learning environment** – roles and responsibilities (teachers need to help students become active learners who can take increasing responsibility for their progress)

Resources on Assessment for Learning (aka Formative Assessment)

Formative Assessment for Students with Disabilities.

Commissioned by the Council of Chief State School Officers State Collaborative on Assessing Special Education Students and Formative Assessment, Washington, DC. https://www.ccsso.org/sites/default/files/2017-12/Formative_Assessment_for_Students_with_Disabilities.pdf

56 different ways to gather evidence of student achievement” Formative assessment”

*Collaborative Learning, Independent Learning. Retrieved from <https://schools.archmil.org/CentersofExcellence/DOCsPDFs/Learning-Support-Teams/2015-16/October-8-2015/Formative->

[Assessments/FormativeAssessmentandMonitoringStudentProgress.pdf](#) This resource has links to technology tools for formative assessment and monitoring student progress.

[Formative Assessment Toolkit](#): from the *West Virginia Department of Education*.

60 Non-Threatening Formative Assessment Techniques (downloadable link) . bit.ly/2EfAj7m

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- Assessment for Learning Introduction: http://oer.educ.cam.ac.uk/wiki/Assessment_for_Learning_Introduction
- Assessment for Learning Research Summary: http://oer.educ.cam.ac.uk/wiki/Assessment_for_Learning_Research_Summary

<https://www.youtube.com/user/EngageNY> (CC BY NC SA)

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Lesson 6.4: Validity

For an assessment to be high quality it needs to have good validity and reliability as well as absence from bias.

Validity

Validity is the evaluation of the "adequacy and appropriateness of the interpretations and uses of assessment results" for a given group of individuals (Linn & Miller, 2005, p. 68). For example, is it appropriate to conclude that the results of a mathematics test on fractions given to recent immigrants accurately represents their understanding of fractions? Is it appropriate for the teacher to conclude, based on her observations, that a kindergarten student, Jasmine, has Attention Deficit Disorder because she does not follow the teachers oral instructions? Obviously in each situation other interpretations are possible that the immigrant students have poor English skills rather than mathematics skills, or that Jasmine may be hearing impaired.

It is important to understand that validity refers to the *interpretation and uses made of the results* of an assessment procedure not of the assessment procedure itself. For example, making judgments about the results of the same test on fractions may be valid if the students all understand English well. A teacher concluding from her observations that the kindergarten student has Attention Deficit Disorder (ADD) may be appropriate if the student has been screened for hearing and other disorders (although the classification of a disorder like ADD cannot be made by one teacher). Validity involves making an overall judgment of the degree to which the interpretations and uses of the assessment results are justified. Validity is a matter of degree (e.g. high, moderate, or low validity) rather than all-or none (e.g. totally valid vs invalid) (Linn & Miller, 2005).

Three sources of evidence are considered when assessing validity— content, construct and predictive. **Content validity** evidence is associated with the question: How well does the assessment include the content or tasks it is supposed to? For example, suppose your educational psychology instructor devises a mid-term test and tells you this includes chapters one to seven in the text book. Obviously, all the items in test should be based on the content from educational psychology, not your methods or cultural foundations classes. Also, the items in the test should cover content from all seven chapters and not just chapters three to seven— unless the instructor tells you that these chapters have priority.

Teachers' have to be clear about their purposes and priorities for instruction *before* they can begin to gather evidence related content validity. Content validation determines the degree that assessment tasks are relevant and representative of the tasks judged by the teacher (or test developer) to represent their goals and objectives (Linn & Miller, 2005). It is important for teachers to think about content validation when devising assessment tasks and one way to help do this is to devise a Table of Specifications. An example, based on Pennsylvania's State standards for grade 3 geography, is in . In the left hand column is the instructional content for a 20-item test the teacher has decided to construct with two kinds of instructional objectives: identification and uses or locates. The second and third columns identify the number of items for each content area and each instructional objective. Notice that the teacher has decided that six items should be devoted to the sub area of geographic representations- more than any other sub area. Devising a table of specifications helps teachers determine if some content areas or concepts are over-sampled (i.e. there are too many items) and some concepts are under-sampled (i.e. there are too few items).

Table **Lesson6.4.1** : Example of Table of Specifications: grade 3 basic geography literacy

Content	Instructional objective	Identifies	Uses or locates	Total number of items	Per cent of items
Identify geography tools and their uses					
Geographic representations: e.g. maps, globe, diagrams and photographs	3	3	6	30%	
Spatial information: sketch & thematic maps	1	1	2	10%	
Mental maps	1	1	2	10%	
Identify and locate places and regions					
Physical features (e.g. lakes, continents)	1	2	3	15%	
Human features (countries, states, cities)	3	2	5	25%	
Regions with unifying geographic characteristics e.g. river basins	1	1	2	10%	
Number of items	10	10	20		
Percentage of items	50%	50%		100%	

Construct validity evidence is more complex than content validity evidence. Often we are interested in making broader judgments about student's performances than specific skills such as doing fractions. The focus may be on constructs such as mathematical reasoning or reading comprehension. A construct is a characteristic of a person we assume exists to help explain behavior. For example, we use the concept of test anxiety to explain why some individuals when taking a test have difficulty concentrating, have physiological reactions such as sweating, and perform poorly on tests but not in class assignments. Similarly mathematics reasoning and reading comprehension are constructs as we use them to help explain performance on an assessment. Construct validation is the process of determining the extent to which performance on an assessment can be interpreted in terms of the intended constructs and is not influenced by factors irrelevant to the construct. For example, judgments about recent immigrants' performance on a mathematical reasoning test administered in English will have low construct validity if the results are influenced by English language skills that are irrelevant to mathematical problem solving. Similarly, construct validity of end-of-semester examinations is likely to be poor for those students who are highly anxious when taking major tests but not during regular class periods or when doing assignments. Teachers can help increase construct validity by trying to reduce factors that influence performance but are irrelevant to the construct being assessed. These factors include anxiety, English language skills, and reading speed (Linn & Miller 2005).

A third form of validity evidence is called **criterion-related validity**. Selective colleges in the USA use the ACT or SAT among other criteria to choose who will be admitted because these standardized tests help predict freshman grades, i.e. have high criterion-related validity. Some K-12 schools give students math or reading tests in the fall semester in order to predict which are likely to do well on the annual state tests administered in the spring semester and which students are unlikely to pass the tests and will need additional assistance. If the tests administered in fall do not predict students' performances accurately then the additional assistance may be given to the wrong students illustrating the importance of criterion- related validity.

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Lesson 6.5: Reliability

Reliability refers to the consistency of the measurement (Linn & Miller 2005). Suppose Mr Garcia is teaching a unit on food chemistry in his tenth grade class and gives an assessment at the end of the unit using test items from the teachers' guide. Reliability is related to questions such as: How similar would the scores of the students be if they had taken the assessment on a Friday or Monday? Would the scores have varied if Mr Garcia had selected different test items, or if a different teacher had graded the test? An assessment provides information about students by using a specific measure of performance at one particular time. Unless the results from the assessment are reasonably consistent over different occasions, different raters, or different tasks (in the same content domain) confidence in the results will be low and so cannot be useful in improving student learning.

Obviously we cannot expect perfect consistency. Students' memory, attention, fatigue, effort, and anxiety fluctuate and so influence performance. Even trained raters vary somewhat when grading assessment such as essays, a science project, or an oral presentation. Also, the wording and design of specific items influence students' performances. However, some assessments are more reliable than others and there are several strategies teachers can use to increase reliability

First, assessments with more tasks or items typically have higher reliability. To understand this, consider two tests one with five items and one with 50 items. Chance factors influence the shorter test more than the longer test. If a student does not understand one of the items in the first test the total score is very highly influenced (it would be reduced by 20 per cent). In contrast, if there was one item in the test with 50 items that were confusing, the total score would be influenced much less (by only 2 percent). Obviously this does not mean that assessments should be inordinately long, but, on average, enough tasks should be included to reduce the influence of chance variations. Second, clear directions and tasks help increase reliability. If the directions or wording of specific tasks or items are unclear, then students have to guess what they mean undermining the accuracy of their results. Third, clear scoring criteria are crucial in ensuring high reliability (Linn & Miller, 2005). Later in this chapter we describe strategies for developing scoring criteria for a variety of types of assessment.

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CHAPTER OVERVIEW

7: Keys to Effective Feedback

7 Keys to Effective Feedback

Characteristics	Outcome
1) Goal-referenced	Learner knows whether they are on track towards a goal or need to change course.
2) Tangible & transparent	Learners can understand exactly how your feedback relates to the task at hand.
3) Actionable	Learners know specifically what actions to take to move towards their goal
4) User-friendly	Learner finds the feedback appropriate to his/her cognitive level.
5) Timely	Learner receives feedback while the attempt and effect are still fresh in their mind.
6) Ongoing	Learner has multiple opportunities to learn and improve towards the ultimate goal.
7) Consistent	Learner can adjust his/her performance based on stable, accurate, and trust-worthy feedback.

Lesson 7.1: Feedback

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Lesson 7.1: Feedback

UQx LEARNx team of contributors



Professor Merrilyn Goos from The University of Queensland defines what we mean by ‘feedback for deep learning’.

Feedback is something that tells you if you’re on the right track or not. In a nutshell, feedback is information provided on the performance or understanding of a task which can then be used to improve this performance or understanding. Feedback helps to close the gap between actual performance and intended performance. There are a multitude of different types of feedback and we encounter many of these in our everyday lives.

Feedback can come from a diverse variety of sources as well. Feedback doesn’t need to be formal. In fact, some feedback is very informal and we hardly recognize it for what it is. Feedback has a powerful influence on learning and in particular on deep engagement with content. If we would like our students to have a full understanding of a task and gain skills they can use in the future and transfer to other tasks, then effective feedback on learning is crucial.

For a fuller understanding of the nature of feedback and closing the gap between actual performance and intended performance, we need to explore the different purposes, types, and levels of feedback and ask three important questions:

- 1) Where am I going?
- 2) How am I going? and
- 3) Where to next?

(Hattie & Timperley, 2007).

In exploring the Hattie and Timperley (2007) feedback model and the three feedback questions, van den Bergh, Ros and Beijaard (2012, p. 345) state:

The first question is about the learning goals: ‘Where am I going?’

The second question that has to be answered is: ‘How am I going?’ Learners need to know how the current performance relates to the learning goals.

Finally, learners will ask: ‘Where to next?’ What activities need to be undertaken to make better progress?

Conditions of effective feedback

Dr Cameron Brooks from the School of Education at The University of Queensland explores what conditions are important for effective feedback and how powerful effective feedback can be for deep learning.

CAMERON BROOKS: Effective feedback is essential for deep learning. Though, what is often overlooked is the potential for feedback to have variable effects on learning.

The use of feedback is regarded as one of the most powerful strategies to improve student achievement and you may or may not be aware of just how much attention it receives in education policy and practice. As we explore effective feedback, I want you to reflect on ways feedback has influenced you in your own learning journey.

Feedback is typically viewed as information given to the student which is designed to cause modifications of actions and result in learning.

Recently, this cause-and-effect notion of feedback has been challenged as the provision of feedback is no guarantee of learning. Research suggests that much of feedback that is given is in fact rarely used by students. For this reason, we need to focus upon how

feedback is being received rather than just how feedback is given. The effects of feedback on learning have been studied by educational and psychological researchers since the early 20th century.

Feedback is typically related with greater academic achievement, improvements in student work, and enhanced student motivation. Further investigation of feedback research, however, reveals that feedback produces highly variable effects upon learning. Numerous variables are identified in feedback literature that affect how feedback is received and used by students. These including the *purpose, focus and timing of feedback*.

Feedback can serve many different purposes such as to provide: a grade, a justification of a grade, a qualitative description of the work, praise, encouragement, identification of errors, suggestions of how to fix errors and guidance on how to improve the work standard.

- Feedback can be directive and tell students where they went wrong or facilitative and provide guidance on how to improve.
- Feedback that includes elaborations about how to improve is more likely to lead to improvements in learning efficiency and student achievement.
- Improvement based feedback that includes guidance is more effective than statements about whether work is right or wrong as it takes into consideration how feedback is received by learners.

Literature on student perceptions of feedback includes findings that students become frustrated with feedback that is too general or tells them where they went wrong but does not provide guidance on how to improve. Effective feedback tells students how they are doing in relation to goals and criteria and then provides guidance and opportunities for improvement.

Unfortunately, much of feedback that is given in classrooms is directed to the self, rather than to these specific learning elements of tasks. Research directed to the self, most commonly given as praise, has been found to have negative impacts upon learning as it can contribute towards learners developing a mindset that sees achievement as a fixed attribute rather than something to be worked on and improved.

Early, behavioristic feedback models used feedback as a means of reinforcement of behavior with the belief that feedback needs to be immediate to help condition a response. As cognitivist theories emerged, researchers began to investigate the effects of immediate versus delayed feedback upon learning.

Immediate feedback vs. delayed feedback

Immediate feedback is more likely to be effective for the acquisition of verbal, procedural and some motor skills. While immediate feedback is helpful during initial task acquisition, it can negate deeper learning during tasks that encourage fluency and development of skills and understanding.

In fact, delayed feedback can be more effective for difficult tasks due to the benefits associated with learners' processing and thinking about methods to satisfy task requirements. Therefore, delayed feedback may be beneficial for deeper learning where learning concepts can be transferred from one context to another. This is of course dependent upon the type of task and the developmental capability of the learner.

Four common, key conditions for effective feedback are evident from research:

1. Clarifying expectations and standards for the learner.
2. Scheduling ongoing, targeted feedback within the learning period.
3. Fostering practices to develop self-assessment, and
4. Providing feed forward opportunities to close the feedback loop.

Let's have a look at each of these conditions in more detail.

1. Clarifying expectations and standards for the learner.

use of exemplars or models. Exemplars are particularly effective as they clearly depict the required standards and enable students to make a direct comparison between their own work and the stated standards of the exemplar. Students also report they value feedback that is matched to the assessment criteria.

2. Scheduling ongoing, targeted feedback within the learning period.

3. Fostering practices to develop self-assessment

Self-regulation is a key process within an effective model of feedback for deep learning. Self-regulated learners are cognizant of both the standards and criteria and their own current levels of performance or achievement. To develop self-regulatory behaviors, learners must be regularly engaged in tasks and activities that are matched to the criteria for success and include processes, such as self-assessment, that encourage critical thinking and reflection.

4. Providing feed forward opportunities to close the feedback loop.

Click here to watch the video. (8:02 minutes)



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Click here to watch the video (8:41 minutes). The [Feedback Matrix](#) can be printed out at the link.



<https://granite.pressbooks.pub/teachingdiverselearners/?p=264>

Peer Feedback

Dr. Melissa Cain from The University of Queensland explores the many advantages of providing and receiving peer feedback.

MELISSA CAIN: Have you ever been asked to provide feedback to a friend or colleague? Did you find that easy? What concerns did you have? Were you worried that your feedback wouldn't be welcomed or that it might not be helpful?

Alternative assessment methods such as peer assessment are growing in popularity and have been found to receive a more positive response from students than more traditional assessment approaches. Engaging in peer feedback as part of the formative assessment process develops a range of critical thinking skills and is important in developing deep learning competencies.

Stephen Bostock, Head of the Centre for Learning, Teaching and Assessment at Glyndwr University relates that there are many benefits in providing and receiving peer feedback. Engaging in peer feedback gives students a sense of belonging and encourages a sense of ownership in the process.

This type of engagement also helps students recognize assessment criteria; and develops a wide range of transferable skills. Interacting with their peers in this manner provides learners opportunities to problem solve and reflect. It increases a sense of responsibility, promotes independent learning and encourages them to be open to a variety of perspectives. Commenting on the work of peers enables learners to engage with assessment criteria; thus, inducting them into assessment practices and tacit knowledge. Learners are then able to develop an understanding of standards which they can potentially transfer of their own work.

Challenges of peer assessment

There are, however, some challenges surrounding the provision of effective peer feedback. Ryan Daniel, professor of creative arts at James Cook University, suggests that there exists the potential for resistance to peer feedback as it appears to challenge the authority of teachers as experts.

Indeed, students themselves have strong views about the effectiveness of peer assessment methods. This includes an awareness of their own deficiencies in subject areas; not being sure of their own objectivity; the influence of interpersonal factors such as friendship; and the belief that it is not their job but the teachers' to provide feedback.

Learners may also be cautious of being criticized by their peers and worry about a lack of confidence in their ability to provide effective feedback. Part of this issue relates to the issue of teacher power in the classroom. As this power is usually considered absolute by students, they may in fact, consider their role to please teachers rather than demonstrate their learning in providing feedback. Providing effective peer feedback cannot be a one time event. Learners need to be prepared over time to provide effective feedback.

Spiller (2011) suggests that learners need to be coached using examples and models and should be involved in establishing their own assessment criteria if possible. Teachers should demonstrate how they can match the work of a learner to an exemplar which most closely resembles its qualities. And everyone should engage in rich discussions about the process following the provision of peer feedback. As students become better at providing peer feedback over time, they gain confidence and become more competent at it.

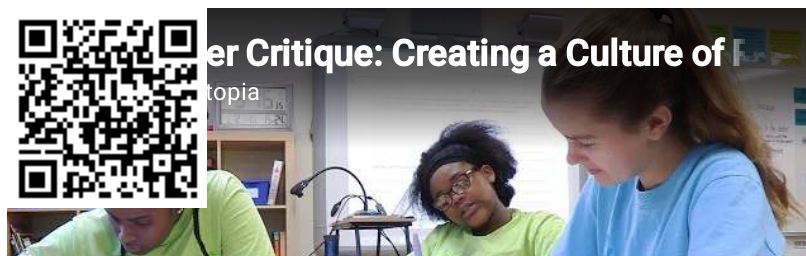
Learning to provide peer feedback has many advantages. Most importantly, when students evaluate their peers' work and provide timely, specific, and personalized feedback, they have the opportunity to scrutinize their own work as well. And this is a critical factor in deep learning.

Peer Critique: Creating a Culture of Revision

Your students can improve their work by recognizing the strengths and weaknesses in the work of others.

Be Kind, Be Specific, Be Helpful

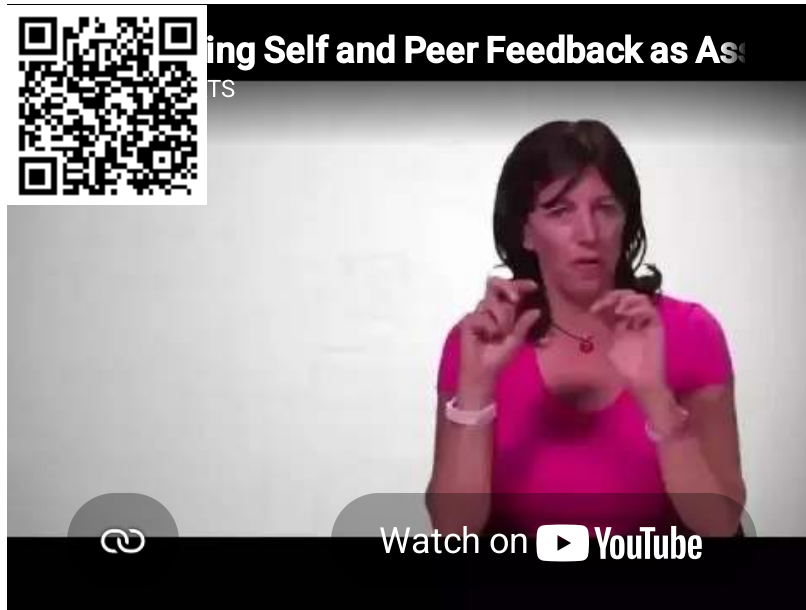
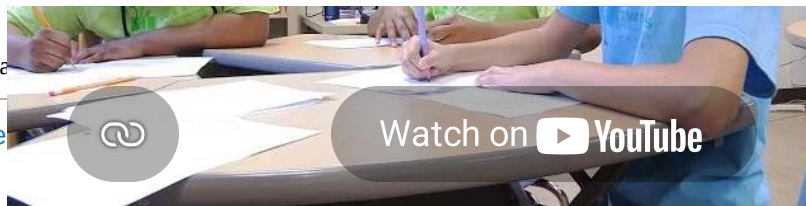
Click here to watch video from Edutopia: (4:32 minutes)



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Using Self and Peer Fe

Click here to watch video



granite.pressbooks.pub/teachingdiverselearners/?p=264

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CHAPTER OVERVIEW

8: Forms of Thinking

A few years ago one of us (Kelvin) had the privilege of co-teaching with an experienced first grade teacher, Carolyn Eaton. As part of a research project, Ms Eaton allowed some of her reading lessons to be observed. Here is what Kelvin saw when Ms Eaton was having a conference with Joey. They are reading a book "together", except that Ms Eaton wants Joey to do as much reading as possible himself. Joey's comments are capitalized, and Ms Eaton's are in lowercase.

JOEY: FIRST YOU READ-THEN ME. THIS IS WHAT YOU HAVE TO DO. I READ AFTER YOU, OK?

Ms Eaton: OK. [Ms Eaton begins.] "In the great green room there was a telephone, a red balloon, and a picture of..." Are you going to read, or what?

YES.

"In the great green room there was..." Are you ready yet? Ready to read?

OK. "IN THE GREAT GREEN ROOM. . . "

"...there was..."

"THERE WAS A..." [pauses, looking at Ms Eaton rather than at the words]

"...a telephone..."

YES, THAT'S IT, A TELEPHONE! "IN THE GREAT GREEN ROOM THERE WAS A TELEPHONE, A RED BALLOON..."

"and a picture of..."

"AND A PICTURE OF" [pauses, staring at the wall]. "A COW JUMPING?"

"a cow jumping over the moon".

"OVER MOON" [smiles from both Joey and Ms Eaton].

Joey, what does this say? [She points to the word telephone.]

"THERE WAS A TELEPHONE".

How about here? [She points to next page, which reads "And there were three little bears, sitting on chairs".]

"THERE WERE BEARS, THREE BEARS, AND THEY SAT ON CHAIRS".

Can you read the whole book?

SURE!

OK, then you start this time.

[Joey looks at first page, alternately at the picture and at the words.]

"IN THE GREAT GREENROOM THERE WAS A TELEPHONE".

[Actual text: "In the great green room, there was a telephone",]

"AND THERE WAS A RED BALLOON",

[Actual text: "...and a red balloon",]

"AND A PICTURE OF THE COW JUMPING OVER THE MOON".

[Actual text: "...and a picture of the cow jumping over the moon".]

"AND THERE WERE..." THREE BEARS?... "LITTLE BEARS SITTING ON CHAIRS".

[Actual text: "And there were three little bears, sitting on chairs,..."]

Could you read this book with you eyes closed?

SURE; WANT TO SEE ME DO IT?!

Well, not right now; maybe another time. Could you read it without the pictures, just looking at the words? That's how I do best—when I see the words instead of the pictures.

[Joey pauses to consider this.] MAYBE, BUT NOT QUITE SO WELL.

Let's try it. [Ms Eaton proceeds to copy the words on a large sheet for Joey to "read" later.]

As Carolyn Eaton's behavior suggests, there are decisions to make "on the fly", even during the very act of teaching. Ms Eaton wonders when to challenge Joey, and when to support him. She also wonders when to pause and ask Joey to take stock of what he has read, and when to move him on ahead— when to consolidate a student's learning, and when to nudge the student forward. These are questions about instructional strategies which *facilitate complex learning*, either directly or indirectly. In this chapter we review as many strategies as space allows, in order to give a sense of the major instructional options and of their effects. We concentrate especially on two broad categories of instruction, which we call *direct instruction* and *student-centered instruction*. As we hope that you will see, each approach to teaching is useful for certain purposes. We begin, though, by looking at the ways students think, or at least how teachers would like students to think. What does it mean for students to think critically (astutely or logically)? Or to think creatively? Or to be skillful problem solvers? Forms of thinking lead to choices among instructional strategies.

[Lesson 8.1: Forms of Thinking Associated with Classroom Learning](#)

[Lesson 8.2: Critical Thinking and Creative Thinking](#)

[Lesson 8.3: Problem-Solving](#)

[Lesson 8.4: Broad Instructional Strategies that Stimulate Complex Thinking](#)

[Lesson 8.5: Questioning](#)

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Lesson 8.1: Forms of Thinking Associated with Classroom Learning

Although instructional strategies differ in their details, they each encourage particular forms of learning and thinking. The forms have distinctive educational purposes, even though they sometimes overlap, in the sense that one form may contribute to success with another form. Consider three somewhat complex forms of thinking that are commonly pursued in classroom learning: (1) critical thinking, (2) creative thinking, and (3) problem-solving.

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Lesson 8.2: Critical Thinking and Creative Thinking

Critical thinking

Critical thinking requires skill at analyzing the reliability and validity of information, as well as the attitude or disposition to do so. The skill and attitude may be displayed with regard to a particular subject matter or topic, but in principle it can occur in any realm of knowledge (Halpern, 2003; Williams, Oliver, & Stockade, 2004). A critical thinker does not necessarily have a negative attitude in the everyday sense of constantly criticizing someone or something. Instead, he or she can be thought of as *astute*: the critical thinker asks key questions, evaluates the evidence for ideas, reasons for problems both logically and objectively, and expresses ideas and conclusions clearly and precisely. Last (but not least), the critical thinker can apply these habits of mind in more than one realm of life or knowledge.

With such a broad definition, it is not surprising that educators have suggested a variety of specific cognitive skills as contributing to critical thinking. In one study, for example, the researcher found how critical thinking can be reflected in regard to a published article was stimulated by **annotation**— writing questions and comments in the margins of the article (Liu, 2006). In this study, students were initially instructed in ways of annotating reading materials. Later, when the students completed additional readings for assignments, it was found that some students in fact used their annotation skills much more than others— some simply underlined passages, for example, with a highlighting pen. When essays written about the readings were later analyzed, the ones written by the annotators were found to be more well reasoned— more critically astute— than the essays written by the other students.

In another study, on the other hand, a researcher found that critical thinking can also involve oral discussion of personal issues or dilemmas (Hawkins, 2006). In this study, students were asked to verbally describe a recent, personal incident that disturbed them. Classmates then discussed the incident together in order to identify the precise reasons why the incident was disturbing, as well as the assumptions that the student made in describing the incident. The original student— the one who had first told the story— then used the results of the group discussion to frame a topic for a research essay. In one story of a troubling incident, a student told of a time when a store clerk has snubbed or rejected the student during a recent shopping errand. Through discussion, classmates decided that an assumption underlying the student's disturbance was her suspicion that she had been a victim of racial profiling based on her skin color. The student then used this idea as the basis for a research essay on the topic of "racial profiling in retail stores". The oral discussion thus stimulated critical thinking in the student and the classmates, but it also *relied* on their prior critical thinking skills at the same time.

Notice that in both of these research studies, as in others like them, what made the thinking "critical" was students' use of **metacognition**— strategies for thinking *about* thinking and for monitoring the success and quality of one's own thinking. This concept was discussed in Chapter 2 as a feature of constructivist views about learning. There we pointed out that when students acquire experience in building their own knowledge, they also become skilled both at knowing *how* they learn, and at knowing *whether* they have learned something well. These are two defining qualities of metacognition, but they are part of critical thinking as well. In fostering critical thinking, a teacher is really fostering a student's ability to construct or control his or her own thinking and to avoid being controlled by ideas unreflectively.

How best to teach critical thinking remains a matter of debate. One issue is whether to infuse critical skills into existing courses or to teach them through separate, free-standing units or courses. The first approach has the potential advantage of integrating critical thinking into students' entire educations. But it risks diluting students' understanding and use of critical thinking simply because critical thinking takes on a different form in each learning context. Its details and appearance vary among courses and teachers. The free-standing approach has the opposite qualities: it stands a better chance of being understood clearly and coherently, but at the cost of obscuring how it is related to other courses, tasks, and activities. This dilemma is the issue— again— of **transfer**, discussed in Chapter 2. Unfortunately, research to compare the different strategies for teaching critical thinking does not settle the matter. The research suggests simply that either infusion or free-standing approaches can work as long as it is implemented thoroughly and teachers are committed to the value of critical thinking (Halpern, 2003).

A related issue about teaching critical thinking is about deciding who needs to learn critical thinking skills the most. Should it be all students, or only some of them? Teaching all students seems the more democratic alternative and thus appropriate for educators. Surveys have found, however, that teachers sometimes favor teaching of critical thinking only to high-advantage students— the

ones who already achieve well, who come from relatively high- income families, or (for high school students) who take courses intended for university entrance (Warburton & Torff, 2005). Presumably the rationale for this bias is that high- advantage students can benefit and/or understand and use critical thinking better than other students. Yet, there is little research evidence to support this idea, even if it were not ethically questionable. The study by Hawkins (2006) described above, for example, is that critical thinking was fostered even with students considered low-advantage.

Creative thinking

Creativity is the ability to make or do something new that is also useful or valued by others (Gardner, 1993). The "something" can be an object (like an essay or painting), a skill (like playing an instrument), or an action (like using a familiar tool in a new way). To be creative, the object, skill, or action cannot simply be bizarre or strange; it cannot be new without also being useful or valued, and not simply be the result of accident. If a person types letters at random that form a poem by chance, the result may be beautiful, but it would not be creative by the definition above. Viewed this way, creativity includes a wide range of human experience that many people, if not everyone, have had at some time or other (Kaufman & Baer, 2006). The experience is not restricted to a few geniuses, nor exclusive to specific fields or activities like art or the composing of music.

Especially important for teachers are two facts. The first is that an important form of creativity is **creative thinking**, the generation of ideas that are new as well as useful, productive, and appropriate. The second is that creative thinking can be stimulated by teachers' efforts. Teachers can, for example, encourage students' **divergent thinking**— ideas that are open-ended and that lead in many directions (Torrance, 1992; Kim, 2006). Divergent thinking is stimulated by open-ended questions— questions with many possible answers, such as the following:

- How many uses can you think of for a cup?
- Draw a picture that somehow incorporates all of these words: cat, fire engine, and banana.
- What is the most unusual use you can think of for a shoe?

Note that answering these questions creatively depends partly on having already acquired knowledge about the objects to which the questions refer. In this sense divergent thinking depends partly on its converse, **convergent thinking**, which is focused, logical reasoning about ideas and experiences that lead to specific answers. Up to a point, then, developing students' convergent thinking— as schoolwork often does by emphasizing mastery of content— facilitates students' divergent thinking indirectly, and hence also their creativity (Sternberg, 2003; Runco, 2004; Cropley, 2006). But carried to extremes, excessive emphasis on convergent thinking may discourage creativity.

Whether in school or out, creativity seems to flourish best when the creative activity is its own intrinsic reward, and a person is relatively unconcerned with what others think of the results. Whatever the activity— composing a song, writing an essay, organizing a party, or whatever— it is more likely to be creative if the creator focuses on and enjoys the activity in itself, and thinks relatively little about how others may evaluate the activity (Brophy, 2004). Unfortunately, encouraging students to ignore others' responses can sometimes pose a challenge for teachers. Not only is it the teachers' job to evaluate students' learning of particular ideas or skills, but also they have to do so within restricted time limits of a course or a school year. In spite of these constraints, though, creativity still can be encouraged in classrooms at least some of the time (Claxton, Edwards, & Scale-Constantinou, 2006). Suppose, for example, that students have to be assessed on their understanding and use of particular vocabulary. Testing their understanding may limit creative thinking; students will understandably focus their energies on learning "right" answers for the tests. But assessment does not have to happen constantly. There can also be times to encourage experimentation with vocabulary through writing poems, making word games, or in other thought-provoking ways. These activities are all potentially creative. To some extent, therefore, learning content and experimenting or playing with content can both find a place— in fact one of these activities can often support the other. We return to this point later in this chapter, when we discuss student-centered strategies of instruction, such as cooperative learning and play as a learning medium.

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Lesson 8.3: Problem-Solving

Somewhat less open-ended than creative thinking is **problem solving**, the analysis and solution of tasks or situations that are complex or ambiguous and that pose difficulties or obstacles of some kind (Mayer & Wittrock, 2006). Problem solving is needed, for example, when a physician analyzes a chest X-ray: a photograph of the chest is far from clear and requires skill, experience, and resourcefulness to decide which foggy-looking blobs to ignore, and which to interpret as real physical structures (and therefore real medical concerns). Problem solving is also needed when a grocery store manager has to decide how to improve the sales of a product: should she put it on sale at a lower price, or increase publicity for it, or both? Will these actions actually increase sales enough to pay for their costs?

Problem solving in the classroom

Problem solving happens in classrooms when teachers present tasks or challenges that are deliberately complex and for which finding a solution is not straightforward or obvious. The responses of students to such problems, as well as the strategies for assisting them, show the key features of problem solving. Consider this example, and students' responses to it. We have numbered and named the paragraphs to make it easier to comment about them individually:

Scene #1: a problem to be solved

*A teacher gave these instructions: "Can you connect all of the dots below using only **four** straight lines?" She drew the following display on the chalkboard:*

 **Figure Lesson8.3.1:** The teacher gave these instructions: "Can you connect these dots with only four lines.. (Copyright; author via source)

The problem itself and the procedure for solving it seemed very clear: simply experiment with different arrangements of four lines. But two volunteers tried doing it at the board, but were unsuccessful. Several others worked at it at their seats, but also without success.

Scene #2: coaxing students to re-frame the problem

When no one seemed to be getting it, the teacher asked, "Think about how you've set up the problem in your mind— about what you believe the problem is about. For instance, have you made any assumptions about how long the lines ought to be? Don't stay stuck on one approach if it's not working!"

Scene #3: Alicia abandons a fixed response

After the teacher said this, Alicia indeed continued to think about how she saw the problem. "The lines need to be no longer than the distance across the square," she said to herself. So she tried several more solutions, but none of them worked either.

*The teacher walked by Alicia's desk and saw what Alicia was doing. She repeated her earlier comment: "Have you assumed anything about how long the lines ought to be?" Alicia stared at the teacher blankly, but then smiled and said, "Hmm! You didn't actually **say** that the lines could be no longer than the matrix! Why not make them longer?" So she experimented again using oversized lines and soon discovered a solution:*

 **Exhibit Lesson8.3.2:** Alicia's solution. (CC-BY-NC; K. Seifert, R. Sutton via [Educational Psychology](#))

Scene #4: Willem's and Rachel's alternative strategies

*Meanwhile, Willem worked on the problem. As it happened, Willem loved puzzles of all kinds, and had ample experience with them. He had not, however, seen this particular problem. "It **must** be a trick," he said to himself, because he knew from experience that problems posed in this way often were not what they first appeared to be. He mused to himself: "Think outside the box, they always tell you..." And **that** was just the hint he needed: he drew lines outside the box by making them longer than the matrix and soon came up with this solution:*

 **Exhibit Lesson8.3.3:** Willem's and Rachel's solution. (CC-BY-NC; K. Seifert, R. Sutton via [Educational Psychology](#))

When Rachel went to work, she took one look at the problem and knew the answer immediately: she had seen this problem before, though she could not remember where. She had also seen other drawing-related puzzles, and knew that their solution always depended on making the lines longer, shorter, or differently angled than first expected. After staring at the dots briefly, she drew a solution faster than Alicia or even Willem. Her solution looked exactly like Willem's.

This story illustrates two common features of problem solving: the effect of degree of structure or constraint on problem solving, and the effect of mental obstacles to solving problems. The next sections discuss each of these features, and then looks at common techniques for solving problems.

The effect of constraints: well-structured versus ill-structured problems

Problems vary in how much information they provide for solving a problem, as well as in how many rules or procedures are needed for a solution. A **well-structured problem** provides much of the information needed and can in principle be solved using relatively few clearly understood rules. Classic examples are the word problems often taught in math lessons or classes: everything you need to know is contained within the stated problem and the solution procedures are relatively clear and precise. An **ill-structured problem** has the converse qualities: the information is *not* necessarily within the problem, solution procedures are potentially quite numerous, and a multiple solutions are likely (Voss, 2006). Extreme examples are problems like "How can the world achieve lasting peace?" or "How can teachers insure that students learn?"

By these definitions, the nine-dot problem is relatively well-structured— though not completely. Most of the information needed for a solution is provided in *Scene #1*: there are nine dots shown and instructions given to draw four lines. But not *all* necessary information was given: students needed to consider lines that were longer than implied in the original statement of the problem. Students had to "think outside the box", as Willem said— in this case, literally.

When a problem is well-structured, so are its solution procedures likely to be as well. A well-defined procedure for solving a particular kind of problem is often called an **algorithm**; examples are the procedures for multiplying or dividing two numbers or the instructions for using a computer (Leiserson, et al., 2001). Algorithms are only effective when a problem is very well-structured and there is no question about whether the algorithm is an appropriate choice for the problem. In that situation it pretty much guarantees a correct solution. They do not work well, however, with ill-structured problems, where they are ambiguities and questions about how to proceed or even about precisely *what* the problem is about. In those cases it is more effective to use **heuristics**, which are general strategies— "rules of thumb", so to speak— that do not always work, but often do, or that provide at least partial solutions. When beginning research for a term paper, for example, a useful heuristic is to scan the library catalogue for titles that look relevant. There is no guarantee that this strategy will yield the books most needed for the paper, but the strategy works enough of the time to make it worth trying.

In the nine-dot problem, most students began in *Scene #1* with a simple algorithm that can be stated like this: "Draw one line, then draw another, and another, and another". Unfortunately this simple procedure did not produce a solution, so they had to find other strategies for a solution. Three alternatives are described in *Scenes #3* (for Alicia) and *4* (for Willem and Rachel). Of these, Willem's response resembled a heuristic the most: he knew from experience that a good *general* strategy that *often* worked for such problems was to suspect a deception or trick in how the problem was originally stated. So he set out to question what the teacher had meant by the word line, and came up with an acceptable solution as a result.

Common obstacles to solving problems

The example also illustrates two common problems that sometimes happen during problem solving. One of these is **functional fixedness**: a tendency to regard the *functions* of objects and ideas as *fixed* (German & Barrett, 2005). Over time, we get so used to one particular purpose for an object that we overlook other uses. We may think of a dictionary, for example, as necessarily something to verify spellings and definitions, but it also can function as a gift, a doorstop, or a footstool. For students working on the nine-dot matrix described in the last section, the notion of "drawing" a line was also initially fixed; they assumed it to be connecting dots but not extending lines beyond the dots. Functional fixedness sometimes is also called **response set**, the tendency for a person to frame or think about each problem in a series in the same way as the previous problem, even when doing so is not appropriate to later problems. In the example of the nine-dot matrix described above, students often tried one solution after another, but each solution was constrained by a set response not to extend any line beyond the matrix.

Functional fixedness and the response set are obstacles in **problem representation**, the way that a person understands and organizes information provided in a problem. If information is misunderstood or used inappropriately, then mistakes are likely—if indeed the problem can be solved at all. With the nine-dot matrix problem, for example, construing the instruction to draw four lines as meaning "draw four lines entirely within the matrix" means that the problem simply could not be solved. For another, consider this problem: "The number of water lilies on a lake doubles each day. Each water lily covers exactly one square foot. If it takes 100 days for the lilies to cover the lake exactly, how many days does it take for the lilies to cover exactly *half* of the lake?" If you think that the size of the lilies affects the solution to this problem, you have not represented the problem correctly. Information about lily size is *not* relevant to the solution, and only serves to distract from the truly crucial information, the fact that the lilies *double* their coverage each day. (The answer, incidentally, is that the lake is half covered in 99 days; can you think why?)

Strategies to assist problem solving

Just as there are cognitive obstacles to problem solving, there are also general strategies that help the process be successful, regardless of the specific content of a problem (Thagard, 2005). One helpful strategy is **problem analysis**—identifying the parts of the problem and working on each part separately. Analysis is especially useful when a problem is ill-structured. Consider this problem, for example: "Devise a plan to improve bicycle transportation in the city." Solving this problem is easier if you identify its parts or component subproblems, such as (1) installing bicycle lanes on busy streets, (2) educating cyclists and motorists to ride safely, (3) fixing potholes on streets used by cyclists, and (4) revising traffic laws that interfere with cycling. Each separate subproblem is more manageable than the original, general problem. The solution of each subproblem contributes the solution of the whole, though of course is not equivalent to a whole solution.

Another helpful strategy is **working backward** from a final solution to the originally stated problem. This approach is especially helpful when a problem is well-structured but also has elements that are distracting or misleading when approached in a forward, normal direction. The water lily problem described above is a good example: starting with the day when *all* the lake is covered (Day 100), ask what day would it therefore be *half* covered (by the terms of the problem, it would have to be the day before, or Day 99). Working backward in this case encourages reframing the extra information in the problem (i. e. the size of each water lily) as merely distracting, not as crucial to a solution.

A third helpful strategy is **analogical thinking**—using knowledge or experiences with similar features or structures to help solve the problem at hand (Bassok, 2003). In devising a plan to improve bicycling in the city, for example, an analogy of cars with bicycles is helpful in thinking of solutions: improving conditions for both vehicles requires many of the same measures (improving the roadways, educating drivers). Even solving simpler, more basic problems is helped by considering analogies. A first grade student can partially decode unfamiliar printed words by analogy to words he or she has learned already. If the child cannot yet read the word *screen*, for example, he can note that part of this word looks similar to words he may already know, such as *seen* or *green*, and from this observation derive a clue about how to read the word *screen*. Teachers can assist this process, as you might expect, by suggesting reasonable, helpful analogies for students to consider.

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Lesson 8.4: Broad Instructional Strategies that Stimulate Complex Thinking

Because the forms of thinking just described— critical thinking, creativity and problem solving— are broad and important educationally, it is not surprising that educators have identified strategies to encourage their development. Some of the possibilities are shown in Table 24 and group several instructional strategies along two dimensions: how much the strategy is student-centered and how much a strategy depends on group interaction. It should be emphasized that the two-way classification in Table 24 is not very precise, but it gives a useful framework for understanding the options available for planning and implementing instruction. The more important of the two dimensions in the table is the first one— the extent to which an instructional strategy is either directed by the teacher or initiated by students. We take a closer look at this dimension in the next part of this chapter, followed by discussion of group-oriented teaching strategies.

Table *Lesson8.4.1*: Major instructional strategies grouped by level of teacher direction and student focus

Directed by student(s) more			
Emphasizes groups somewhat more	Cooperative learning Inquiry Discovery Learning	Self-reflection Independent study Concept maps	Emphasizes individuals somewhat more
	Lectures	Mastery learning	
	Direct instruction	Textbook readings	
	Madeline Hunter’s “Effective Teaching”	Advance organizers	
		Outlining	
		Recalling, relating, and elaborating	
Directed by teacher more			

Definitions of Terms in Table *Lesson8.4.1*:

Lecture – Telling or explaining previously organized information—usually to a group

Assigned reading – Reading, usually individually, of previously organized information

Advance organizers – Brief overview, either verbally or graphically, of material about to be covered in a lecture or text

Outlining – Writing important points of a lecture or reading, usually in a hierarchical format

Taking notes – Writing important points of a lecture or reading, often organized according to the learning needs of an individual student

Concept maps – Graphic depiction of relationships among a set of concepts, terms, or ideas; usually organized by the student, but not always

Madeline Hunter’s “Effective Teaching” – A set of strategies that emphasizes clear presentation of goals, the explanation and modeling of tasks to students and careful monitoring of students’ progress toward the goals

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Lesson 8.5: Questioning

Faculty of Education and UQx LEARNx team of contributors, The Open Resource Bank for Interactive Teaching, and University of Cambridge



Introduction

Types Of Question, section Intro). (ORBIT)

Questioning Techniques

- For every student query, teachers asked approximately 11 questions
- Students averaged less than one question each, while teachers averaged more than 200 questions each
- Teachers often answered their own questions
- Fewer teacher questions requires deep thinking by the learner

Summary of research

Effective questioning

Questioning is one of the most extensively researched areas of teaching and learning. This is because of its central importance in the teaching and learning process. The research falls into three broad categories

- What is effective questioning?
- How do questions engage students and promote responses?
- How do questions develop students' cognitive abilities?

What is effective questioning?

- Questions are planned and closely linked to the objectives of the lesson.
- The learning of basic skills is enhanced by frequent questions following the exposition of new content that has been broken down into small steps. Each step should be followed by guided practice that provides opportunities for students to consolidate what they have learned and that allows teachers to check understanding.
- Closed questions are used to check factual understanding and recall.
- Open questions predominate.
- Sequences of questions are planned so that the cognitive level increases as the questions go on. This ensures that students are led to answer questions which demand increasingly higher-order thinking skills, but are supported on the way by questions which require less sophisticated thinking skills.
- Students have opportunities to ask their own questions and seek their own answers. They are encouraged to provide feedback to each other.
- The classroom climate is one where students feel secure enough to take risks, be tentative and make mistakes.

The research emphasizes the importance of using open, higher-level questions to develop students' higher-order thinking skills.

balance between open and closed questions, depending on the topic and objectives for the lesson. A closed question, such as 'What is the next number in the sequence?', can be extended by a follow-up question, such as 'How did you work that out?'

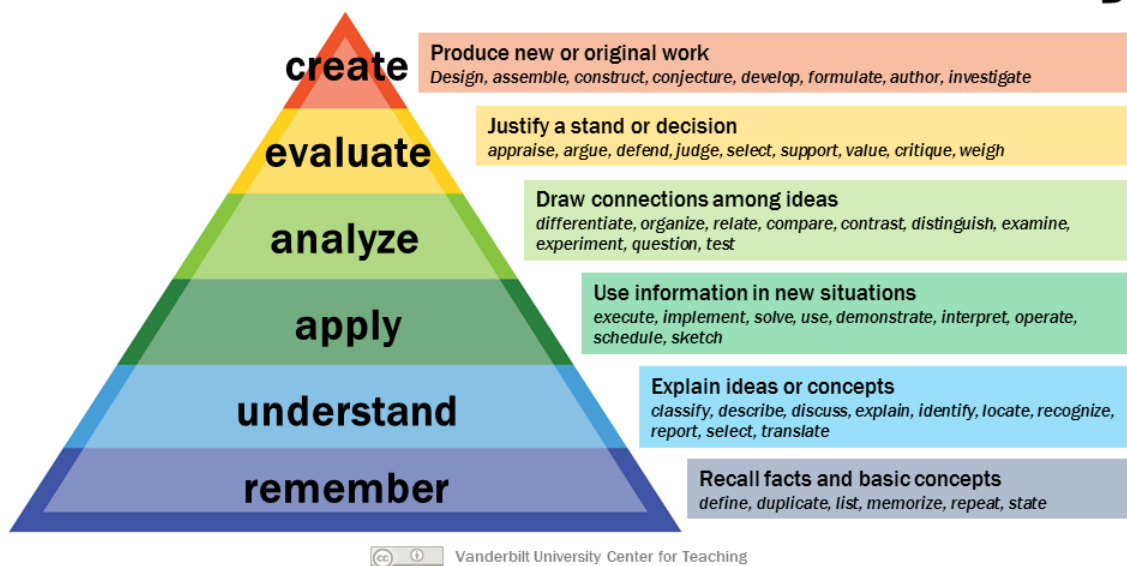
Overall, the research shows that effective teachers use a greater number of higher- order questions and open questions than less effective teachers.

How do questions engage students and promote responses?

- there is a classroom climate in which students feel safe and know they will not be criticized or ridiculed if they give a wrong answer
- prompts are provided to give students confidence to try an answer
- there is a 'no-hands' approach to answering, where you choose the respondent rather than have them volunteer
- 'wait time' is provided before an answer is required. The research suggests that 3 seconds is about right for most questions, with the proviso that more complex questions may need a longer wait time. Research shows that the average wait time in classrooms is about 1 second (Rowe 1986; Borich 1996)

How do questions develop students' cognitive abilities?

Bloom's Taxonomy



On this scale, recalling relevant knowledge is the lowest-order thinking skill and creating is the highest.

Common Pitfalls of Questioning and possible solutions

Not being clear about why you are asking the question: You will need to reflect on the kind of lesson you are planning. Is it one where you are mainly focusing on facts, rules and sequences of actions? If that is the case, you will be more likely to ask closed questions which relate to knowledge. Or is it a lesson where you are focusing mainly on comprehension, concepts and abstractions? In that case you will be more likely to use open questions which relate to analysis, synthesis and evaluation.

Asking too many closed questions that need only a short answer: It helps if you plan open questions in advance. Another strategy is to establish an optimum length of response by saying something like 'I don't want an answer of less than 15 words.'

Asking too many questions at once: Asking about a complex issue can often lead to complex questions. Since these questions are oral rather than written, students may find it difficult to understand what is required and they become confused. When you are dealing with a complex subject, you need to tease out the issues for yourself first and focus each question on one idea only. It also helps to use direct, concrete language and as few words as possible.

Asking difficult questions without building up to them: This happens when there isn't a planned sequence of questions of increasing difficulty. Sequencing questions is necessary to help students to move to the higher levels of thinking.

Asking superficial questions: It is possible to ask lots of questions but not get to the center of the issue. You can avoid this problem by planning probing questions in advance. They can often be built in as follow-up questions to extend an answer.

Asking a question then answering it yourself: What's the point? This pitfall is often linked to another problem: not giving students time to think before they answer. Build in 'wait time' to give students a chance to respond. You could say 'Think about your answer for 3 seconds, then I will ask.' You could also provide prompts to help.

Asking bogus 'guess what's in my head' questions: Sometimes teachers ask an open question but expect a closed response. If you have a very clear idea of the response you want, it is probably better to tell students by explaining it to them rather than trying to get there through this kind of questioning. Remember, if you ask open questions you must expect to get a range of answers. Acknowledge all responses. This can easily be done by saying 'thank you'.

Focusing on a small number of students and not involving the whole class: One way of avoiding this is to get the whole class to write their answers to closed questions and then show them to you together. Some teachers use small whiteboards for this. Another possibility, which may be more effective for more open questions, is to use the 'no-hands' strategy, where you pick the respondent rather than having them volunteer. One advantage of this is that you can ask students questions of appropriate levels of difficulty. This is a good way of differentiating to ensure inclusion.

Dealing ineffectively with wrong answers or misconceptions: Teachers sometimes worry that they risk damaging students' self-esteem by correcting them. There are ways of handling this positively, such as providing prompts and scaffolds to help students correct their mistakes. It is important that you correct errors sensitively or, better still, get other students to correct them.

Not treating students' answers seriously: Sometimes teachers simply ignore answers that are a bit off-beam. They can also fail to see the implications of these answers and miss opportunities to build on them. You could ask students why they have given that answer or if there is anything they would like to add. You could also ask other students to extend the answer. It is important not to cut students off and move on too quickly if they have given a wrong answer.

Practical tips

- Be clear about why you are asking the questions. Make sure they will do what you want them to do.
- Plan sequences of questions that make increasingly challenging cognitive demands on students.
- Give students time to answer and provide prompts to help them if necessary. Ask conscripts rather than volunteers to answer questions

Reflection

- Look again at the list of pitfalls and think about your own teaching. Which of these traps have you fallen into during recent lessons?
- How might you have avoided them?

Additional Resources

[Download Printable Version for quick reference](#)

References

oer.educ.cam.ac.uk/wiki/Quest...search_Summary and <http://oer.educ.cam.ac.uk/wiki/Teach...es/Questioning> (CC BY NC SA)

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CHAPTER OVERVIEW

9: Creating Assessment Questions

Kym teaches sixth grade students in an urban school where most of the families in the community live below the poverty line. Each year the majority of the students in her school fail the state-wide tests. Kym follows school district teaching guides and typically uses direct instruction in her Language Arts and Social Studies classes. The classroom assessments are designed to mirror those on the state-wide tests so the students become familiar with the assessment format. When Kym is in a graduate summer course on motivation she reads an article called, "Teaching strategies that honor and motivate inner-city African American students" (Teel, Debrin-Parecki, & Covington, 1998) and she decides to change her instruction and assessment in fall in four ways. First, she stresses an incremental approach to ability focusing on effort and allows students to revise their work several times until the criteria are met. Second, she gives students choices in performance assessments (e.g. oral presentation, art project, creative writing). Third, she encourages responsibility by asking students to assist in classroom tasks such as setting up video equipment, handing out papers etc. Fourth, she validates student' cultural heritage by encouraging them to read biographies and historical fiction from their own cultural backgrounds. Kym reports that the changes in her students' effort and demeanor in class are dramatic: students are more enthusiastic, work harder, and produce better products. At the end of the year twice as many of her students pass the State-wide test than the previous year.

Afterward, Kym still teaches sixth grade in the same school district and continues to modify the strategies described above. Even though the performance of the students she taught improved the school was closed because, on average, the students' performance was poor. Kym gained a Ph.D and teaches Educational Psychology to preservice and inservice teachers in evening classes.

Kym's story illustrates several themes related to assessment that we explore in this chapter on teacher-made assessment strategies and in the Chapter 12 on standardized testing. First, choosing effective classroom assessments is related to instructional practices, beliefs about motivation, and the presence of state-wide standardized testing. Second, some teacher-made classroom assessments enhance student learning and motivation —some do not. Third, teachers can improve their teaching through action research. This involves identifying a problem (e.g. low motivation and achievement), learning about alternative approaches (e.g. reading the literature), implementing the new approaches, observing the results (e.g. students' effort and test results), and continuing to modify the strategies based on their observations.

Best practices in assessing student learning have undergone dramatic changes in the last 20 years. When Rosemary was a mathematics teacher in the 1970s, she did not assess students' learning she *tested* them on the mathematics knowledge and skills she taught during the previous weeks. The tests varied little format and students always did them individually with pencil and paper. Many teachers, including mathematics teachers, now use a wide variety of methods to determine what their students have learned and also use this assessment information to modify their instruction. In this chapter the focus is on using classroom assessments to improve student learning and we begin with some basic concepts.

[Lesson 9.1: Basic Concepts](#)

[Lesson 9.2: Absence of Bias](#)

[Lesson 9.3: Selected Response Questions](#)

[Lesson 9.4: Constructed Response Items](#)

[Lesson 9.5: Rubrics](#)

[Lesson 9.6: Performance Assessment](#)

[Lesson 9.7: Portfolios](#)

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Lesson 9.1: Basic Concepts

Assessment is an integrated process of *gaining information* about students' learning and *making value judgments* about their progress (Linn & Miller, 2005). Information about students' progress can be obtained from a variety of sources including projects, portfolios, performances, observations, and tests. The information about students' learning is often assigned specific numbers or grades and this involves **measurement**. Measurement answers the question, "How much?" and is used most commonly when the teacher scores a test or product and assigns numbers (e.g. 28 /30 on the biology test; 90/100 on the science project). **Evaluation** is the process of making judgments about the assessment information (Airasian, 2005). These judgments may be about individual students (e.g. should Jacob's course grade take into account his significant improvement over the grading period?), the assessment method used (e.g. is the multiple choice test a useful way to obtain information about problem solving), or one's own teaching (e.g. most of the students this year did much better on the essay assignment than last year so my new teaching methods seem effective).

The primary focus in this chapter is on **assessment for learning**, where the priority is designing and using assessment strategies to enhance student learning and development. Assessment for learning is often **formative assessment**, i.e. it takes place during the course of instruction by providing information that teachers can use to revise their teaching and students can use to improve their learning (Black, Harrison, Lee, Marshall & Wiliam, 2004). Formative assessment includes both **informal assessment** involving spontaneous unsystematic observations of students' behaviors (e.g. during a question and answer session or while the students are working on an assignment) and **formal assessment** involving pre-planned, systematic gathering of data. **Assessment of learning** is formal assessment that involves assessing students in order to certify their competence and fulfill accountability mandates and is the primary focus of the next chapter on standardized tests but is also considered in this chapter. Assessment of learning is typically **summative**, that is, administered after the instruction is completed (e.g. a final examination in an educational psychology course). Summative assessments provide information about how well students mastered the material, whether students are ready for the next unit, and what grades should be given (Airasian, 2005).

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Lesson 9.2: Absence of Bias

Bias occurs in assessment when there are components in the assessment method or administration of the assessment that distort the performance of the student because of their personal characteristics such as gender, ethnicity, or social class (Popham, 2005). Two types of assessment bias are important: *offensiveness* and *unfair penalization*. An assessment is most likely to be offensive to a subgroup of students when negative stereotypes are included in the test. For example, the assessment in a health class could include items in which all the doctors were men and all the nurses were women. Or, a series of questions in a social studies class could portray Latinos and Asians as immigrants rather than native born Americans. In these examples, some female, Latino or Asian students are likely to be offended by the stereotypes and this can distract them from performing well on the assessment.

Unfair penalization occurs when items disadvantage one group not because they may be offensive but because of differential background experiences. For example, an item for math assessment that assumes knowledge of a particular sport may disadvantage groups not as familiar with that sport (e.g. American football for recent immigrants). Or an assessment on team work that asks students to model their concept of a team on a symphony orchestra is likely to be easier for those students who have attended orchestra performances— probably students from affluent families. Unfair penalization does not occur just because some students do poorly in class. For example, asking questions about a specific sport in a physical education class when information on that sport had been discussed in class is not unfair penalization as long as the questions do not require knowledge beyond that taught in class that some groups are less likely to have.

It can be difficult for new teachers teaching in multi-ethnic classrooms to devise interesting assessments that do not penalize any groups of students. Teachers need to think seriously about the impact of students' differing backgrounds on the assessment they use in class. Listening carefully to what students say is important as is learning about the backgrounds of the students.

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Lesson 9.3: Selected Response Questions

Common formal assessment formats used by teachers are *multiple choice*, *matching*, and *true/false items*. In selected response items students have to select a response provided by the teacher or test developer rather than constructing a response in their own words or actions. Selected response items do not require that students recall the information but rather *recognize* the correct answer. Tests with these items are called *objective* because the results are not influenced by scorers' judgments or interpretations and so are often machine scored. Eliminating potential errors in scoring increases the reliability of tests but teachers who only use objective tests are liable to reduce the validity of their assessment because objective tests are not appropriate for all learning goals (Linn & Miller, 2005). Effective assessment *for* learning as well as assessment *of* learning must be based on aligning the assessment technique to the learning goals and outcomes.

For example, if the goal is for students to conduct an experiment then they should be asked to do that rather than being asked *about* conducting an experiment.

Common problems

Selected response items are easy to score but are hard to devise. Teachers often do not spend enough time constructing items and common problems include:

1. Unclear wording in the items

- *True or False*: Although George Washington was born into a wealthy family, his father died when he was only 11, he worked as a youth as a surveyor of rural lands, and later stood on the balcony of Federal Hall in New York when he took his oath of office in 1789.

2. Cues that are not related the content being examined.

- A common clue is that all the true statements on a true/false test or the corrective alternatives on a multiple choice test are longer than the untrue statements or the incorrect alternatives.

3. Using negatives (or double negatives) the items.

- A poor item. "True or False: None of the steps made by the student was unnecessary."
- A better item. True or False: "All of the steps were necessary."

Students often do not notice the negative terms or find them confusing so avoiding them is generally recommended (Linn & Miller 2005J. However, since standardized tests often use negative items, teachers sometimes deliberately include some negative items to give students practice in responding to that format.

4. Taking sentences directly from textbook or lecture notes.

Removing the words from their context often makes them ambiguous or can change the meaning. For example, a statement from Chapter 3 taken out of context suggests all children are clumsy. "Similarly with jumping, throwing and catching: the large majority of children can do these things, though often a bit clumsily." A fuller quotation makes it clearer that this sentence refers to 5-year-olds: For some fives, running still looks a bit like a hurried walk, but usually it becomes more coordinated within a year or two. Similarly with jumping, throwing and catching: the large majority of children can do these things, though often a bit clumsily, by the time they start school, and most improve their skills noticeably during the early elementary years." If the abbreviated form was used as the stem in a true/false item it would obviously be misleading.

5. Avoid trivial questions

e.g. Jean Piaget was born in what year?

- a) 1896
- b) 1900
- c) 1880
- d) 1903

While it important to know approximately when Piaget made his seminal contributions to the understanding of child development, the exact year of his birth (1880) is not important.

Strengths and weaknesses

All types of selected response items have a number of strengths and weaknesses. *True/False* items are appropriate for measuring factual knowledge such as vocabulary, formulae, dates, proper names, and technical terms. They are very efficient as they use a simple structure that students can easily understand, and take little time to complete. They are also easier to construct than multiple choice and matching items. However, students have a 50 per cent probability of getting the answer correct through guessing so it can be difficult to interpret how much students know from their test scores. Examples of common problems that arise when devising true/false items are in Table **Lesson9.3.1**.

Table **Lesson9.3.1**: Common errors in selected response items

Type of item	Common errors	Example										
True False	The statement is not absolutely true—typically because it contains a broad generalization.	T F The President of the United States is elected to that office. This is usually true but the US Vice President can succeed the President.										
	The item is opinion not fact .	T F Education for K-12 students is improved though policies that support charter schools. Some people believe this, some do not.										
	Two ideas are included in item	T F George H Bush the 40th president of the US was defeated by William Jefferson Clinton in 1992. <i>The 1st idea is false; the 2ndis true making it difficult for students to decide whether to circle T or F.</i>										
	Irrelevant cues	T FThe President of the United States is usually elected to that office. True items contain the words such as usually generally; whereas false items contain the terms such as always, all, never.										
Matching	Columns do not contain homogeneous information	Directions: On the line to the US Civil War Battle write the year or confederate general in Column B. <table><tr><th>Column A</th><th>Column B</th></tr><tr><td>Ft. Sumter</td><td>General Stonewall Jackson</td></tr><tr><td>2nd Battle of Bull Run</td><td>General Johnson</td></tr><tr><td>Ft Henry</td><td>1861</td></tr><tr><td></td><td>1862</td></tr></table>	Column A	Column B	Ft. Sumter	General Stonewall Jackson	2nd Battle of Bull Run	General Johnson	Ft Henry	1861		1862
	Column A	Column B										
	Ft. Sumter	General Stonewall Jackson										
2nd Battle of Bull Run	General Johnson											
Ft Henry	1861											
	1862											
		Column B is a mixture of generals and dates.										
	Too many items in each list	Lists should be relatively short (4 – 7) in each column. More than 10 are too confusing.										
	Responses are not in logical order	In the example with Spanish and English words should be in a logical order (they are alphabetical). If the order is not logical, student spend too much time searching for the correct answer.										
Multiple Choice	Problem (i.e. the stem) is not clearly stated problem	New Zealand a) Is the worlds’ smallest continent b) Is home to the kangaroo c) Was settled mainly by colonists from Great Britain d) Is a dictatorship This is really a series of true-false items. Because the correct answer is c) a better										

Type of item	Common errors	Example
		version with the problem in the stem is Much of New Zealand was settled by colonists from a) Great Britain b) Spain c) France d) Holland
	Some of the alternatives are not plausible	Who is best known for their work on the development of the morality of justice. 1. Gerald Ford 2. Vygotsky 3. Maslow 4. Kohlberg Obviously Gerald Ford is not a plausible alternative.
	Irrelevant cues Use of “All of above”	1. Correct alternative is longer 2. Incorrect alternatives are not grammatically correct with the stem 3. Too many correct alternatives are in position “b” or “c” making it easier for students to guess. All the options (e.g. a, b, c, d) should be used in approximately equal frequently (not exact as that also provides clues). 4. If all of the “above is used” then the other items must be correct. This means that a student may read the 1st response, mark it correct and move on. Alternatively, a student may read the 1st two items and seeing they are true does not need to read the other alternatives to know to circle “all of the above”. The teacher probably does not want either of these options.

In *matching items*, two parallel columns containing terms, phrases, symbols, or numbers are presented and the student is asked to match the items in the first column with those in the second column. Typically there are more items in the second column to make the task more difficult and to ensure that if a student makes one error they do not have to make another. Matching items most often are used to measure lower level knowledge such as persons and their achievements, dates and historical events, terms and definitions, symbols and concepts, plants or animals and classifications (Linn & Miller, 2005). An example with Spanish language words and their English equivalents is below:

Column A	Column B
____1. Casa	A. Aunt
____2. Bebé	B. Baby
____3. Gata	C. Brother
____4. Perro	D. Cat
____5. Hermano	E. Dog
	F. Father
	G. House

While matching items may seem easy to devise it is hard to create homogenous lists. Other problems with matching items and suggested remedies are in **Lesson 9.3.1**.

Multiple Choice items are the most commonly used type of objective test items because they have a number of advantages over other objective test items. Most importantly they can be adapted to assess higher levels thinking such as application as well as lower level factual knowledge. The first example below assesses knowledge of a specific fact whereas the second example assesses application of knowledge.

Who is best known for their work on the development of the morality of justice?

- a. Erikson
- b. Vygotsky
- c. Maslow
- d. Kohlberg

Which one of the following best illustrates the law of diminishing returns?

- a. A factory doubled its labor force and increased production by 50 per cent
- b. The demand for an electronic product increased faster than the supply of the product
- c. The population of a country increased faster than agricultural self sufficiency
- d. A machine decreased in efficacy as its parts became worn out (Adapted from Linn and Miller 2005, p, 193).

There are several other advantages of multiple choice items. Students have to recognize the correct answer not just know the incorrect answer as they do in true/false items. Also, the opportunity for guessing is reduced because four or five alternatives are usually provided whereas in true/false items students only have to choose between two choices. Also, multiple choice items do not need homogeneous material as matching items do.

However, creating good multiple choice test items is difficult and students (maybe including you) often become frustrated when taking a test with poor multiple choice items. Three steps have to be considered when constructing a multiple choice item: formulating a clearly stated problem, identifying plausible alternatives, and removing irrelevant clues to the answer. Common problems in each of these steps are summarized in the Table on the next page

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Lesson 9.4: Constructed Response Items

Formal assessment also includes constructed response items in which students are asked to recall information and create an answer — not just recognize if the answer is correct— so guessing is reduced. Constructed response items can be used to assess a wide variety of kinds of knowledge and two major kinds are discussed: completion or short answer (also called short response) and *extended response*.

Completion and short answer

Completion and short answer items can be answered in a word, phrase, number, or symbol. These types of items are essentially the same only varying in whether the problem is presented as a statement or a question (Linn & Miller 2005). For example:

? Exercise *Lesson9.4.1*

Completion: The first traffic light in the US was invented by

Short Answer: Who invented the first traffic light in the US?

These items are often used in mathematics tests, e.g.

? Exercise *Lesson9.4.2*

$3 + 10 = ?$

If $x = 6$, what does $x(x-i) =$

Draw the line of symmetry on the following shape .

A major advantage of these items is they that they are easy to construct. However, apart from their use in mathematics they are unsuitable for measuring complex learning outcomes and are often difficult to score. Completion and short answer tests are sometimes called objective tests as the intent is that there is only one correct answer and so there is no variability in scoring but unless the question is phrased very carefully, there are frequently a variety of correct answers. For example, consider the item Where was President Lincoln born?

The teacher may expect the answer "in a log cabin" but other correct answers are also "on Sinking Spring Farm", 'in Hardin County" or "in Kentucky". Common errors in these items are summarized in Table *Lesson9.4.1*.

Table *Lesson9.4.1* : Common errors in constructed response items

Type of item	Common errors	Example
Completion and short answer	There is more than one possible answer.	e.g. Where was US President Lincoln born? <i>The answer could be in a log cabin, in Kentucky etc.</i>
Extended Response	Too many blanks are in the completion item so it is too difficult or doesn't make sense.	e.g. In theory, the first stage, is when infants process through their and
	Clues are given by length of blanks in completion items.	e.g. Three states are contiguous to New Hampshire: is to the West, ... is to the East and is to the South.
	Ambiguous questions	e.g. Was the US Civil War avoidable? <i>Students could interpret this question in a wide variety of ways, perhaps even stating "yes" or "no". One student may discuss only political causes another moral, political and economic causes. There is no guidance in the question for students.</i>
	Poor reliability in grading	The teacher does not use a scoring rubric and so is inconsistent in how he scores answers especially unexpected responses, irrelevant information, and grammatical errors.
	Perception of student influences grading	By spring semester the teacher has developed expectations of each student's performance and this influences the grading (numbers can be used instead of names). The test consists of three constructed responses and the teacher grades the three answers on each student's paper before moving to the next paper. This means that the grading of questions 2 and 3 are influenced by the answers to question 1 (teachers should grade all the 1st question then the 2nd etc).
	Choices are given on the test and some answers are easier than others.	Testing experts recommend not giving choices in tests because then students are not really taking the same test creating equity problems.

Extended response

Extended response items are used in many content areas and answers may vary in length from a paragraph to several pages. Questions that require longer responses are often called *essay* questions. Extended response items have several advantages and the most important is their adaptability for measuring complex learning outcomes— particularly integration and application. These items also require that students write and therefore provide teachers a way to assess writing skills. A commonly cited advantage to these items is their ease in construction; however, carefully worded items that are related to learning outcomes and assess complex learning are hard to devise (Linn & Miller, 2005). Well-constructed items phrase the question so the task of the student is clear. Often this involves providing hints or planning notes. In the first example below the actual question is clear not only because of the wording but because of the format (i.e. it is placed in a box). In the second and third examples planning notes are provided:

✓ Example *Lesson9.4.1*: Third grade mathematics

The owner of a bookstore gave 14 books to the school. The principal will give an equal number of books to each of three classrooms and the remaining books to the school library. How many books could the principal give to each student and the school?

Show all your work on the space below and on the next page. Explain in words how you found the answer. Tell why you took the steps you did to solve the problem.

From Illinois Standards Achievement Test, 2006; (www.isbe.state.il.us/assessment/isat.htm ')

✓ Example *Lesson9.4.2*: Fifth grade science: The grass is always greener

Jose and Maria noticed three different types of soil, black soil, sand, and clay, were found in their neighborhood. They decided to investigate the question, "How does the type of soil (black soil, sand, and clay) under grass sod affect the height of grass?"

Plan an investigation that could answer their new question.

In your plan, be sure to include:

- Prediction of the outcome of the investigation
- Materials needed to do the investigation
- Procedure that includes:
- logical steps to do the investigation
 - one variable kept the same (controlled)
 - one variable changed (manipulated)
 - any variables being measure and recorded

- how often measurements are taken and recorded

(From Washington State 2004 assessment of student learning)

? Exercise *Lesson9.4.3*: Grades 9-11 English

Writing prompt

Some people think that schools should teach students how to cook. Other people think that cooking is something that ought to be taught in the home. What do you think? Explain why you think as you do.

Planning notes

Choose One:

- I think schools should teach students how to cook
- I think cooking should 1 be taught in the home

I think cooking should be taught in _____ because _____
(school) or (the home)

(From Illinois Measure of Annual Growth in English www.isbe.state.il.us/assessment/image.htm dead link found in the Internet Archive)

A major disadvantage of extended response items is the difficulty in reliable scoring. Not only do various teachers score the same response differently but also the same teacher may score the identical response differently on various occasions (Linn & Miller 2005). A variety of steps can be taken to improve the reliability and validity of scoring. First, teachers should begin by writing an outline of a model answer. This helps make it clear what students are expected to include. Second, a sample of the answers should be read. This assists in determining what the students can do and if there are any common misconceptions arising from the question. Third, teachers have to decide what to do about irrelevant information that is included (e.g. is it ignored or are students

penalized) and how to evaluate mechanical errors such as grammar and spelling. Then, a point scoring or a scoring rubric should be used.

In point scoring components of the answer are assigned points. For example, if students were asked:

? Exercise *Lesson9.4.4*

What are the nature, symptoms, and risk factors of hyperthermia?

Point Scoring Guide:

- Definition (natures) 2 pts
- Symptoms (1 pt for each) 5 pts
- Risk Factors (1 point for each) 5 pts
- Writing 3 pts

This provides some guidance for evaluation and helps consistency but point scoring systems often lead the teacher to focus on facts (e.g. naming risk factors) rather than higher level thinking that may undermine the validity of the assessment if the teachers' purposes include higher level thinking. A better approach is to use a scoring rubric that *describes* the quality of the answer or performance at each level.

Scoring rubrics

Scoring rubrics can be *holistic* or *analytical*. In holistic scoring rubrics, general descriptions of performance are made and a single overall score is obtained. An example from grade 2 language arts in Los Angeles Unified School District classifies responses into four levels: not proficient, partially proficient, proficient and advanced is on Table *Lesson9.4.1*.

Table *Lesson9.4.2* : Example of holistic scoring rubric: English language arts grade 2

Assignment. Write about an interesting, fun, or exciting story you have read in class this year. Some of the things you could write about are:

- What happened in the story (the plot or events)
- Where the events took place (the setting)
- People, animals, or things in the story (the characters)

In your writing make sure you use facts and details from the story to describe everything clearly.

After you write about the story, explain what makes the story interesting, fun or exciting.

Scoring rubric	
Advanced Score 4	The response demonstrates well-developed reading comprehension skills. Major story elements (plot, setting, or characters) are clearly and accurately described. Statements about the plot, setting, or characters are arranged in a manner that makes sense. Ideas or judgments (why the story is interesting, fun, or exciting) are clearly supported or explained with facts and details from the story.
Proficient Score 3	The response demonstrates solid reading comprehension skills. Most statements about the plot, setting, or characters are clearly described. Most statements about the plot, setting, or characters are arranged in a manner that makes sense. Ideas or judgments are supported with facts and details from the story.
Partially Proficient Score 1	The response demonstrates some reading comprehension skills There is an attempt to describe the plot, setting, or characters Some statements about the plot, setting, or characters are arranged in a manner that makes sense. Ideas or judgments may be supported with some facts and details from the story.
Not Proficient Score 1	The response demonstrates little or no skill in reading comprehension. The plot, setting, or characters are not described, or the description is unclear. Statements about the plot, setting, or characters are not arranged in a manner that makes sense. Ideas or judgments are not stated, and facts and details from the text are not used.
Source: Adapted from English Language Arts Grade 2 Los Angeles Unified School District, 2001 (http://www.cse.ucla.edu/resources/justforteachers_set.htm from the Internet Archive)	

Analytical rubrics provide descriptions of levels of student performance on a variety of characteristics. For example, six characteristics used for assessing writing developed by the [Education Northwest](#) are:

- ideas and content
- organization
- voice
- word choice
- sentence fluency
- conventions

Descriptions of high, medium, and low responses for each characteristic are available from [Education Northwest](#)

Holistic rubrics have the advantages that they can be developed more quickly than analytical rubrics. They are also faster to use as there is only one dimension to examine. However, they do not provide students feedback about which aspects of the response are strong and which aspects need improvement (Linn & Miller, 2005). This means they are less useful for assessment *for* learning. An important use of rubrics is to use them as teaching tools and provide them to students *before* the assessment so they know what knowledge and skills are expected.

Teachers can use scoring rubrics as part of instruction by giving students the rubric during instruction, providing several responses, and analyzing these responses in terms of the rubric. For example, use of accurate terminology is one dimension of the science rubric in Table 40. An elementary science teacher could discuss why it is important for scientists to use accurate terminology, give examples of inaccurate and accurate terminology, provide that component of the scoring rubric to students, distribute some examples of student responses (maybe from former students), and then discuss how these responses would be classified according to the rubric. This strategy of assessment for learning should be more effective if the teacher (a) emphasizes to students why using accurate terminology is important when learning science rather than how to get a good grade on the test (we provide more details about this in the section on motivation later in this chapter); (b) provides an exemplary response so students can see a model; and (c) emphasizes that the goal is student improvement on this skill not ranking students.

Table **Lesson9.4.3** Example of a scoring rubric, Science

*On the High School Assessment, the application of a concept to a practical problem or real-world situation will be scored when it is required in the response and requested in the item stem.

	Level of understanding	Use of accurate scientific terminology	Use of supporting details	Synthesis of information	Application of information*
4	There is evidence in the response that the student has a full and complete understanding.	The use of accurate scientific terminology enhances the response.	Pertinent and complete supporting details demonstrate an integration of ideas.	The response reflects a complete synthesis of information.	An effective application of the concept to a practical problem or real-world situation reveals an insight into scientific principles.
3	There is evidence in the response that the student has a good understanding.	The use of accurate scientific terminology strengthens the response.	The supporting details are generally complete.	The response reflects some synthesis of information.	The concept has been applied to a practical problem or real-world situation.
2	There is evidence in the response that the student has a basic understanding.	The use of accurate scientific terminology may be present in the response.	The supporting details are adequate.	The response provides little or no synthesis of information.	The application of the concept to a practical problem or real-world situation is inadequate.
1	There is evidence in the response that the student has some understanding.	The use of accurate scientific terminology is not present in the response.	The supporting details are only minimally effective.	The response addresses the question.	The application, if attempted, is irrelevant.
0	The student has NO UNDERSTANDING of the question or problem. The response is completely incorrect or irrelevant.				

Performance assessments

Typically in performance assessments students complete a specific task while teachers observe the process or procedure (e.g. data collection in an experiment) as well as the product (e.g. completed report) (Popham, 2005; Stiggins, 2005). The tasks that students complete in performance assessments are not simple— in contrast to selected response items— and include the following:

- playing a musical instrument

- athletic skills
- artistic creation
- conversing in a foreign language
- engaging in a debate about political issues
- conducting an experiment in science
- repairing a machine
- writing a term paper
- using interaction skills to play together

These examples all involve complex skills but illustrate that the term performance assessment is used in a variety of ways. For example, the teacher may not observe all of the process (e.g. she sees a draft paper but the final product is written during out-of-school hours) and essay tests are typically classified as performance assessments (Airasian, 2000). In addition, in some performance assessments there may be no clear product (e.g. the performance maybe group interaction skills).

Two related terms, *alternative assessment* and *authentic assessment* are sometimes used instead of performance assessment but they have different meanings (Linn & Miller, 2005). Alternative assessment refers to tasks that are not pencil-and-paper and while many performance assessments are not pencil-and paper tasks some are (e.g. writing a term paper, essay tests). Authentic assessment is used to describe tasks that students do that are similar to those in the "real world". Classroom tasks vary in level of authenticity (Popham, 2005). For example, a Japanese language class taught in a high school in Chicago conversing in Japanese in Tokyo is highly authentic— but only possible in a study abroad program or trip to Japan. Conversing in Japanese with native Japanese speakers in Chicago is also highly authentic, and conversing with the teacher in Japanese during class is moderately authentic. Much less authentic is a matching test on English and Japanese words. In a language arts class, writing a letter (to an editor) or a memo to the principal is highly authentic as letters and memos are common work products. However, writing a five-paragraph paper is not as authentic as such papers are not used in the world of work. However, a five paragraph paper is a complex task and would typically be classified as a performance assessment.

Advantages and disadvantages

There are several advantages of performance assessments (Linn & Miller 2005). First, the focus is on complex learning outcomes that often cannot be measured by other methods. Second, performance assessments typically assess process or procedure as well as the product. For example, the teacher can observe if the students are repairing the machine using the appropriate tools and procedures as well as whether the machine functions properly after the repairs. Third, well designed performance assessments communicate the instructional goals and meaningful learning clearly to students. For example, if the topic in a fifth grade art class is one-point perspective the performance assessment could be drawing a city scene that illustrates one point perspective. (www.sanford-artedventures.com) . This assessment is meaningful and clearly communicates the learning goal. This performance assessment is a good instructional activity and has good content validity— common with well designed performance assessments (Linn & Miller 2005).

One major disadvantage with performance assessments is that they are typically very time consuming for students and teachers. This means that fewer assessments can be gathered so if they are not carefully devised fewer learning goals will be assessed—which can reduce content validity. State curriculum guidelines can be helpful in determining what should be included in a performance assessment. For example, Eric, a dance teacher in a high school in Tennessee learns that the state standards indicate that dance students at the highest level should be able to do demonstrate consistency and clarity in performing technical skills by:

- performing complex movement combinations to music in a variety of meters and styles
- performing combinations and variations in a broad dynamic range
- demonstrating improvement in performing movement combinations through self-evaluation
- critiquing a live or taped dance production based on given criteria
- (<https://www.tn.gov/education/instruction/academic-standards/arts-education.html>)

Eric devises the following performance task for his eleventh grade modern dance class .

In groups 0/4-6 students will perform a dance at least 5 minutes in length. The dance selected should be multifaceted so that all the dancers can demonstrate technical skills, complex movements, and a dynamic range (Items 1-2). Students will videotape their

rehearsals and document how they improved through self evaluation (Item 3). Each group will view and critique the final performance of one other group in class (Item 4). Eric would need to scaffold most steps in this performance assessment. The groups probably would need guidance in selecting a dance that allowed all the dancers to demonstrate the appropriate skills; critiquing their own performances constructively; working effectively as a team, and applying criteria to evaluate a dance.

Another disadvantage of performance assessments is they are hard to assess reliably which can lead to inaccuracy and unfair evaluation. As with any constructed response assessment, scoring rubrics are very important. An example of holistic and analytic scoring rubrics designed to assess a completed *product* are in Table **Lesson9.4.2** and Table **Lesson9.4.3**. A rubric designed to assess the process of group interactions is in Table **Lesson9.4.4**.

Table **Lesson9.4.4** : Example of group interaction rubric

Score	Time management	Participation and performance in roles	Shared involvement
0	Group did not stay on task and so task was not completed.	Group did not assign or share roles.	Single individual did the task.
1	Group was off-task the majority of the time but task was completed.	Groups assigned roles but members did not use these roles.	Group totally disregarded comments and ideas from some members.
2	Group stayed on task most of the time.	Groups accepted and used some but not all roles.	Group accepted some ideas but did not give others adequate consideration.
3	Group stayed on task throughout the activity and managed time well.	Group accepted and used roles and actively participated.	Groups gave equal consideration to all ideas.
4	Group defined their own approach in a way that more effectively managed the activity.	Group defined and used roles not mentioned to them. Role changes took place that maximized individuals' expertise.	Groups made specific efforts to involve all group members including the reticent members.

Source: Adapted from Group Interaction (GI) SETUP (2003). Issues, Evidence and You. Ronkonkomo, NY Lab-Aids. (<http://cse.edc.org/products/assessment/middleschool/scorerub.asp> link through the Internet Archive

This rubric was devised for middle grade science but could be used in other subject areas when assessing group process. In some performance assessments several scoring rubrics should be used. In the dance performance example above Eric should have scoring rubrics for the performance skills, the improvement based on self evaluation, the team work, and the critique of the other group. Obviously, devising a good performance assessment is complex and Linn and Miller (2005) recommend that teachers should:

- Create performance assessments that require students to use complex cognitive skills. Sometimes teachers devise assessments that are interesting and that the students enjoy but do not require students to use higher level cognitive skills that lead to significant learning. Focusing on high level skills and learning outcomes is particularly important because performance assessments are typically so time consuming.
- Ensure that the task is clear to the students. Performance assessments typically require multiple steps so students need to have the necessary prerequisite skills and knowledge as well as clear directions. Careful scaffolding is important for successful performance assessments.
- Specify expectations of the performance clearly by providing students scoring rubrics during the instruction. This not only helps students understand what it expected but it also guarantees that teachers are clear about what they expect. Thinking this through while planning the performance assessment can be difficult for teachers but is crucial as it typically leads to revisions of the actual assessment and directions provided to students.

- Reduce the importance of unessential skills in completing the task. What skills are essential depends on the purpose of the task. For example, for a science report, is the use of publishing software essential? If the purpose of the assessment is for students to demonstrate the process of the scientific method including writing a report, then the format of the report may not be significant. However, if the purpose includes integrating two subject areas, science and technology, then the use of publishing software is important.

Because performance assessments take time it is tempting to include multiple skills without carefully considering if all the skills are essential to the learning goals.

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Lesson 9.5: Rubrics

Scoring rubrics

Scoring rubrics can be holistic or analytical. In holistic scoring rubrics, general descriptions of performance are made and a single overall score is obtained. An example from grade 2 language arts in Los Angeles Unified School District classifies responses into four levels: not proficient, partially proficient, proficient and advanced is on Table 39.

Table 39: Example of holistic scoring rubric: English language arts grade 2

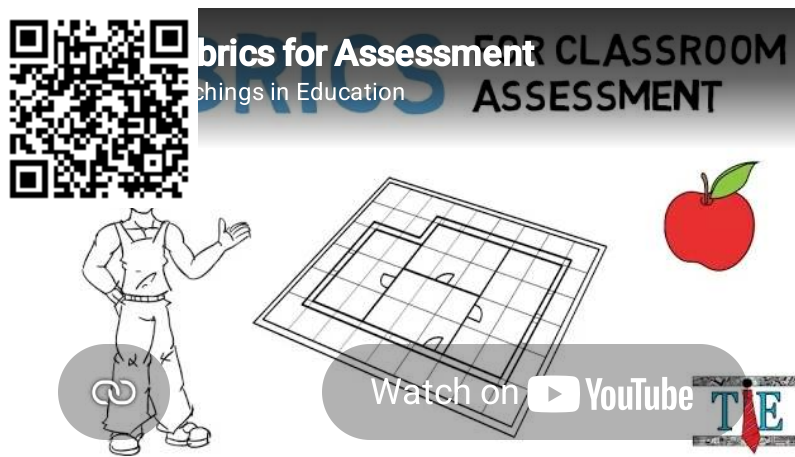
Analytical rubrics provide descriptions of levels of student performance on a variety of characteristics. For example, six characteristics used for assessing writing developed by the Northwest Regional Education Laboratory (NWREL) are:

- ideas *and content*
- organization
- voice
- word *choice*
- sentence *fluency*
- conventions

<http://www.nwrel.org/assessment/toolkit98/traits/index.html>).

Holistic rubrics have the advantages that they can be developed more quickly than analytical rubrics. They are also faster to use as there is only one dimension to examine. However, they do not provide students feedback about which aspects of the response are strong and which aspects need improvement (Linn & Miller, 2005). This means they are less useful for assessment for learning. An important use of rubrics is to use them as teaching tools and provide them to students before the assessment so they know what knowledge and skills are expected.

- This strategy of assessment for learning should be more effective if the teacher:
 - (a) emphasizes to students why using accurate terminology is important when learning science rather than how to get a good grade on the test (we provide more details about this in the section on motivation later in this chapter)
 - (b) provides an exemplary response so students can see a model
 - (c) emphasizes that the goal is student improvement on this skill not ranking students.



References:

Ebook

Seifert, K. and Sutton, R. (2009). *Educational Psychology*. Saylor Foundation. (Chapter 11) Retrieved from open.umn.edu/opentextbooks/BookDetail.aspx?bookId=153 (CC BY)

youtu.be/Ltr6SV8zbn0

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Lesson 9.6: Performance Assessment

Performance assessments

- playing *a musical instrument*
- athletic *skills*
- artistic *creation*
- conversing in a *foreign language*
- engaging in a *debate about political issues*
- conducting an *experiment in science*
- repairing a *machine*
- writing a *term paper*
- using *interaction skills to play together*

Alternative assessment refers to tasks that are not pencil-and-paper and while many performance assessments are not pencil-and-paper tasks some are (e.g. writing a term paper, essay test).

- Alternative assessment also refers an assessment system that is used to assess students with the most significant cognitive disability or multiple disabilities that significantly impact intellectual functioning and adaptive behavior.

Advantages and disadvantages

performance assessments (Linn & Miller 2005). First, the focus is on complex learning outcomes that often cannot be measured by other methods. Second, performance assessments typically assess process or procedure as well as the product. For example, the teacher can observe if the students are repairing the machine using the appropriate tools and procedures as well as whether the machine functions properly after the repairs. Third, well designed performance assessments communicate the instructional goals and meaningful learning clearly to students. For example, if the topic in a fifth-grade art class is one-point perspective the performance assessment could be drawing a city scene that illustrates one-point perspective. This assessment is meaningful and clearly communicates the learning goal. This performance assessment is a good instructional activity and has good content validity—common with well-designed performance assessments (Linn & Miller 2005).

- **One major disadvantage with performance assessments is that they are typically very time consuming for students and teachers. This means that fewer assessments can be gathered so if they are not carefully devised fewer learning goals will be assessed—which can reduce content validity.**
- performing complex movement combinations to music in a variety of meters and styles
- performing combinations and variations in a broad dynamic range
- demonstrating improvement in performing movement combinations through self-evaluation
- critiquing a live or taped dance production based on given criteria
- **Another disadvantage of performance assessments is they are hard to assess reliably which can lead to inaccuracy and unfair evaluation. As with any constructed response assessment, scoring rubrics are very important.**

• **Table 41: Example of group interaction rubric**

middle grade science, but could be used in other subject areas when assessing group process. In some performance assessments, several scoring rubrics should be used. In the dance performance example above Eric should have scoring rubrics for the performance skills, the improvement based on self-evaluation, the team work, and the critique of the other group.

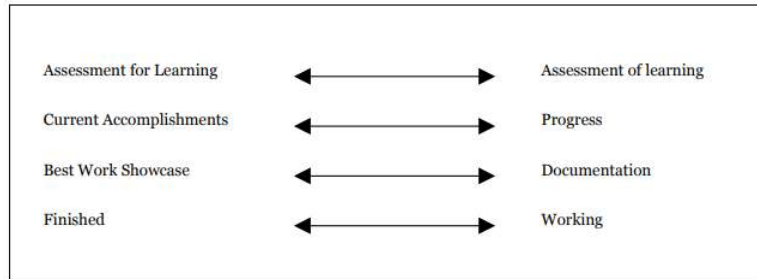
- **Create performance assessments that require students to use complex cognitive skills.** Sometimes teachers devise assessments that are interesting and that the students enjoy but do not require students to use higher level cognitive skills that lead to significant learning. Focusing on high level skills and learning outcomes is particularly important because performance assessments are typically so time consuming.
- **Ensure that the task is clear to the students.** Performance assessments typically require multiple steps so students need to have the necessary prerequisite skills and knowledge as well as clear directions. Careful scaffolding is important for successful performance assessments.

- **Specify expectations of the performance clearly by providing students scoring rubrics during the instruction.** This not only helps students understand what is expected but it also guarantees that teachers are clear about what they expect. Thinking this through while planning the performance assessment can be difficult for teachers, but is crucial as it typically leads to revisions of the actual assessment and directions provided to students.
- **Reduce the importance of unessential skills in completing the task.** What skills are essential depends on the purpose of the task. For example, for a science report, is the use of publishing software essential? If the purpose of the assessment is for students to demonstrate the process of the scientific method including writing a report, then the format of the report may not be significant. However, if the purpose includes integrating two subject areas, science and technology, then the use of publishing software is important. Because performance assessments take time it is tempting to include multiple skills without carefully considering if all the skills are essential to the learning goals.

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Lesson 9.7: Portfolios

"A portfolio is a meaningful collection of student work that tells the story of student achievement or growth" (Arter, Spandel, & Culham, 1995, p. 2). Portfolios are a *purposeful* collection of student work not just folders of all the work a student does. Portfolios are used for a variety of purposes and developing a portfolio system can be confusing and stressful unless the teachers are clear on their purpose. The varied purposes can be illustrated as four dimensions (Linn & Miller 2005):



When the primary purpose is assessment *for* learning, the emphasis is on student self-reflection and responsibility for learning. Students not only select samples of their work they wish to include, but also reflect and interpret their own work. Portfolios containing this information can be used to aid communication as students can present and explain their work to their teachers and parents (Stiggins, 2005). Portfolios focusing on assessment *of* learning contain students' work samples that certify accomplishments for a classroom grade, graduation, state requirements etc. Typically, students have less choice in the work contained in such portfolios as some consistency is needed for this type of assessment. For example, the writing portfolios that fourth and seventh graders are required to submit in Kentucky must contain a self-reflective statement and an example of three pieces of writing (reflective, personal experience or literary, and transactive). Students do choose which of their pieces of writing in each type to include in the portfolio.

([www.kde.state.ky.us/KDE/Instr...ources/Student + Performance + Standards/](http://www.kde.state.ky.us/KDE/Instr...ources/Student+Performance+Standards/) ").

Portfolios can be designed to focus on student progress or current accomplishments. For example, audio tapes of English language learners speaking could be collected over one year to demonstrate growth in learning. Student progress portfolios may also contain multiple versions of a single piece of work. For example, a writing project may contain notes on the original idea, outline, first draft, comments on the first draft by peers or teacher, second draft, and the final finished product (Linn & Miller 2005). If the focus is on current accomplishments, only recent completed work samples are included.

Portfolios can focus on documenting student activities or highlighting important accomplishments. Documentation portfolios are inclusive containing all the work samples rather than focusing on one special strength, best work, or progress. In contrast, showcase portfolios focus on best work. The best work is typically identified by students. One aim of such portfolios is that students learn how to identify products that demonstrate what they know and can do. Students are not expected to identify their best work in isolation but also use the feedback from their teachers and peers.

A final distinction can be made between a finished portfolio— maybe used to for a job application— versus a working portfolio that typically includes day-to-day work samples. Working portfolios evolve over time and are not intended to be used for assessment *of* learning. The focus in a working portfolio is on developing ideas and skills so students should be allowed to make mistakes, freely comment on their own work, and respond to teacher feedback (Linn & Miller, 2005). Finished portfolios are designed for use with a particular audience and the products selected may be drawn from a working portfolio. For example, in a teacher education program, the working portfolio may contain work samples from all the courses taken. A student may develop one finished portfolio to demonstrate she has mastered the required competencies in the teacher education program and a second finished portfolio for her job application.

Advantages and disadvantages

Portfolios used well in classrooms have several advantages. They provide a way of documenting and evaluating growth in a much more nuanced way than selected response tests can. Also, portfolios can be integrated easily into instruction, i.e. used for

assessment *for* learning. Portfolios also encourage student self-evaluation and reflection, as well as ownership for learning (Popham, 2005). Using classroom assessment to promote student motivation is an important component of assessment for learning which is considered in the next section.

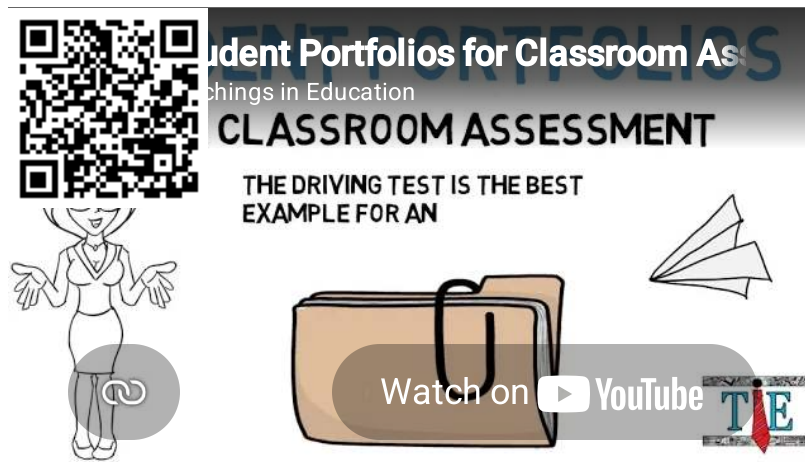
However, there are some major disadvantages of portfolio use. First, good portfolio assessment takes an enormous amount of teacher time and organization. The time is needed to help students understand the purpose and structure of the portfolio, decide which work samples to collect, and to self reflect. Some of this time needs to be conducted in one-to-one conferences. Reviewing and evaluating the portfolios out of class time is also enormously time consuming. Teachers have to weigh if the time spent is worth the benefits of the portfolio use.

Second, evaluating portfolios reliability and eliminating bias can be even more difficult than in a constructed response assessment because the products are more varied. The experience of the state-wide use of portfolios for assessment in writing and mathematics for fourth and eighth graders in Vermont is sobering. Teachers used the same analytic scoring rubric when evaluating the portfolio. In the first two years of implementation samples from schools were collected and scored by an external panel of teachers. In the first year the agreement among raters (i.e. inter-rater reliability) was poor for mathematics and reading; in the second year the agreement among raters improved for mathematics but not for reading. However, even with the improvement in mathematics the reliability was too low to use the portfolios for individual student accountability (Koretz, Stecher, Klein & McCaffrey, 1994). When reliability is low, validity is also compromised because unstable results cannot be interpreted meaningfully.

If teachers do use portfolios in their classroom, the series of steps needed for implementation are outlined in Table 36. If the school or district has an existing portfolio system these steps may have to be modified.

Table 42: Steps in implementing a classroom portfolio program

1. Make sure students own their portfolios.	Talk to your students about your ideas of the portfolio, the different purposes, and the variety of work samples. If possible, have them help make decisions about the kind of portfolio you implement.
2. Decide on the purpose.	Will the focus be on growth or current accomplishments? Best work showcase or documentation? Good portfolios can have multiple purposes but the teacher and students need to be clear about the purpose.
3. Decide what work samples to collect,	For example, in writing, is every writing assignment included? Are early drafts as well as final products included?
4. Collect and store work samples,	Decide where the work sample will be stored. For example, will each student have a file folder in a file cabinet, or a small plastic tub on a shelf in the classroom?
5. Select criteria to evaluate samples,	If possible, work with students to develop scoring rubrics. This may take considerable time as different rubrics may be needed for the variety of work samples. If you are using existing scoring rubrics, discuss with students possible modifications after the rubrics have been used at least once.
6. Teach and require students conduct self evaluations of their own work,	Help students learn to evaluate their own work using agreed upon criteria. For younger students, the self evaluations may be simple (strengths, weaknesses, and ways to improve); for older students a more analytic approach is desirable including using the same scoring rubrics that the teachers will use.
7. Schedule and conduct portfolio conferences ,	Teacher-student conferences are time consuming but conferences are essential for the portfolio process to significantly enhance learning. These conferences should aid students' self evaluation and should take place frequently.
8. Involve parents.	Parents need to understand the portfolio process. Encourage parents to review the work samples. You may wish to schedule parent, teacher-students conferences in which students talk about their work samples.
Source: Adapted from Popham (2005)	



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CHAPTER OVERVIEW

10: Ethics and Legal Issues in Education

Learning Objectives

- Identify the importance of ethics and the ethical practices of teachers.
- Recognize the responsibilities of teachers as role models.
- Determine individual values and code of ethics in becoming a teacher.
- Explain the National Education Association (NEA) Code of Ethics.
- Explain why integrity is an essential disposition for teachers.
- Identify liability of teachers concerning copyright laws, mandated reporting and academic freedom.
- Explain the FERPA law
- Identify landmark legal cases in education and their importance in students' rights in schools.

What the teacher is, is more important than what he teaches -Karl Meninger

Teachers as Professional Role Models

Teachers are important role models for their students both in and out of the classroom. Whether teachers are in school or involved in community functions, there are high standards of behavior expected of them. What is meant by the term professionalism? The term professionalism relates to a certain level of degree, skill or expertise in one's specialized area. Indeed, teachers must obtain schooling, required clinical experience and certain tests in order to enter the field of teaching. In addition to this level of knowledge, teachers must demonstrate integrity, impartiality and ethical behavior in the classroom and in their conduct with parents and coworkers. Teachers must model strong character traits, such as reliability, honesty, respect, lawfulness, patience, fairness, responsibility and collaboration.

In Loco Parentis translates to "in place of parent". Historically schools are basically responsible for students while in the hands of teachers. Therefore, teachers have a great deal of responsibility for the welfare of their students.

[Lesson 10.1: Ethics](#)

[Lesson 10.2: Integrity](#)

[Lesson 10.3: Ethical or Unethical Practices in Testing](#)

[Lesson 10.4: References](#)

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Lesson 10.1: Ethics

Ethics is defined as the discipline of dealing with what is good and bad with moral duty and obligation. As students who will be entering the teaching profession in the next few years, it is imperative to understand that there is a code of ethics that you are expected to follow. Teachers are often held to higher standards than other professions, both in their classrooms and in their personal lives. Teachers are expected to be fair to all their students, not impose their personal views and not abuse their powers as educators. We will examine both the New York State and the National Educator's Association Code of Ethics to get a better understanding of these expectations. These codes of ethics for teachers are designed to protect the rights of all students. The teaching profession requires that individuals be excellent ethical role models.

As a pre-service teacher it is also important to reflect on your own set of values and beliefs. Consider how you will interact with students, manage classroom behavior and assess students' progress. This is just a small part of an educator's duties. The behaviors allowable in your college years may not be acceptable as a new teacher. Everything from the way you dress and speak to how you engage in social media are closely securitized as a teacher. You need to be very conscientious of your appearance, attitudes and behaviors. Teachers are expected to have high ethical standards all the time, both in and out of the classroom.

Activity

- List your own values and code of ethics in becoming a teacher.
- Define integrity and explain why it is an essential disposition for teachers.

Teachers, like other professions, are expected to follow a code of ethics to guide and inform their behavior and decision-making.

The National Education Association's preamble for its code of ethics:

"The Educator, believing in the worth and dignity of each human being, recognizes the supreme importance of the pursuit of truth, devotion to excellence, and nurture of the democratic principles. Essential to these goals is the protection of freedom to learn and to teach and the guarantee of equal educational opportunity for all. The educator accepts the responsibility to adhere to the highest ethical standards."

NEA Code of Ethics

PRINCIPLE I

Commitment to the Student

The educator strives to help each student realize his or her potential as a worthy and effective member of society. The educator therefore works to stimulate the spirit of inquiry, the acquisition of knowledge and understanding, and the thoughtful formulation of worthy goals.

In fulfillment of the obligation to the student, the educator—

1. Shall not unreasonably restrain the student from independent action in the pursuit of learning.
2. Shall not unreasonably deny the student's access to varying points of view.
3. Shall not deliberately suppress or distort subject matter relevant to the student's progress.
4. Shall make reasonable effort to protect the student from conditions harmful to learning or to health and safety.
5. Shall not intentionally expose the student to embarrassment or disparagement.
6. Shall not on the basis of race, color, creed, sex, national origin, marital status, political or religious beliefs, family, social or cultural background, or sexual orientation, unfairly—
 - a. Exclude any student from participation in any program
 - b. Deny benefits to any student
 - c. Grant any advantage to any student
7. Shall not use professional relationships with students for private advantage.
8. Shall not disclose information about students obtained in the course of professional service unless disclosure serves a compelling professional purpose or is required by law.

PRINCIPLE II

Commitment to the Profession

The education profession is vested by the public with a trust and responsibility requiring the highest ideals of professional service.

In the belief that the quality of the services of the education profession directly influences the nation and its citizens, the educator shall exert every effort to raise professional standards, to promote a climate that encourages the exercise of professional judgment, to achieve conditions that attract persons worthy of the trust to careers in education, and to assist in preventing the practice of the profession by unqualified persons.

In fulfillment of the obligation to the profession, the educator—

1. Shall not in an application for a professional position deliberately make a false statement or fail to disclose a material fact related to competency and qualifications.
2. Shall not misrepresent his/her professional qualifications.
3. Shall not assist any entry into the profession of a person known to be unqualified in respect to character, education, or other relevant attribute.
4. Shall not knowingly make a false statement concerning the qualifications of a candidate for a professional position.
5. Shall not assist a noneducator in the unauthorized practice of teaching.
6. Shall not disclose information about colleagues obtained in the course of professional service unless disclosure serves a compelling professional purpose or is required by law.
7. Shall not knowingly make false or malicious statements about a colleague.
8. Shall not accept any gratuity, gift, or favor that might impair or appear to influence professional decisions or action.

(Adopted by the NEA 1975 Representative Assembly (National Education Association, 1975).

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Lesson 10.2: Integrity

“There is no higher value in our society than integrity.” Arlen Specter

Integrity refers to a person having strong moral values. We associate people who have integrity as being honest and decent. To consistently do the “right” thing, even if nobody is watching. According to Seth Meyers, “The good news about integrity is that we’re not born with it—or without it—which means that it’s a behavior-based virtue we can cultivate over time.” (Psychology Today, 2015). Integrity is an extremely important trait to cultivate and highly valued in our society. As future teachers, you are expected to possess this characteristic and held to a higher standard than many other careers.

Activity

Read the article below and be prepared to discuss the following questions:

<http://www.csun.edu/~hfmgt001/honesty.doc>

1. List 3-5 characteristics that demonstrate integrity.
2. Think of an example that shows a person having integrity in a situation.

According to the article, how are integrity and honesty different?

Teachers and Copyright Laws

Teachers are not exempt from copyright laws, and you must be careful about the materials you use in your classroom. In the Copyright Act of 1976, Congress established guidelines for the duplication of copyright works. According to the law, teachers may make a single copy of a chapter of a book, an article, a short story, short essay or poem, a diagram, chart or picture. Educators may make multiple copies of copyrighted work for the use in classroom provided they meet specific guidelines of brevity, spontaneity and cumulative effect. Please refer to the following website for detailed guidelines:

www.custompublisher.com/blog/2007/10/11/the-guidelines-to-classroom-copying-what-are-brevity-spontaneity-and-cumulative-effect/

Teachers also need to be mindful of copyright laws involving electronic media. Pay attention to copyright laws for using videos, DVDs and software programs. Be aware that internet laws are still evolving, and it is best to check with their librarian or media specialist in your school building.

Teachers as Mandated Reporters

In 1974, Congress enacted the Child Abuse Prevention and Treatment Act, which defines child abuse and neglect as the physical or mental injury, sexual abuse, negligent treatment, or maltreatment of a child under the age of 18 by a person who is responsible for the child’s welfare under circumstances that indicate that the child’s welfare is harmed or threatened thereby. All states require teachers and school personnel to report suspected child abuse. Usually a reasonable suspicion, or a reasonable cause to believe is enough to require a teacher to report according to the law. Much more detailed information will be covered on this topic in the EDUC 213 class, you are required to take.

Teachers and Academic Freedom

Teachers have always been allowed a fair amount of academic freedom in creating and teaching their coursework. Academic freedom basically refers to the freedom of teachers to communicate information, without legal interference. So even if a teacher makes an off-color comment about their principal, the school district cannot fire that teacher. However, as previously mentioned, teachers are held to a higher code of ethics and should be mindful of what they say, print and post in social media.

Academic freedom can vary depending on what grades are being taught and where schools are located. Higher education tends to allow more academic freedom than secondary and elementary school teachers. There may be more public pressure about academic freedom of teachers in smaller, more rural schools than larger, city school districts. As future teachers, you need to be mindful of the school district you work in and pay careful attention to how you state facts versus opinions to your students.

The Family Educational Rights and Privacy Act (FERPA):

The Family Education Rights and Privacy Act (FERPA), also known as the Buckley Amendment was passed by Congress in 1974. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education. This law was passed to clarify who had access to students' school records. Included in school records are personal records, grades, test scores and teachers' reports. This law mandated that schools had to share all information about students with their parents and/or legal guardians. It further required schools to explain recorded observations to parents, when requested.

FERPA gives parents certain rights with respect to their children's education records. These rights transfer to the student when he or she reaches the age of 18 or attends a school beyond the high school level. Students to whom the rights have transferred are "eligible students." (U.S. Department of Education, 2018).

If the student is not a dependent, then the student must generally provide consent for the school to disclose the information to the parents.

Legal Issues Involving and Court Cases Involving Students' Rights

Brown v Board of Education:

The famous landmark case, Brown versus the Board of Education involved a nine-year-old girl named Linda Brown when she was refused to attend an all-white elementary school in Topeka, Kansas. Oliver Brown, Linda's father was the prime plaintiff in this case. "In his lawsuit, Brown claimed that schools for black children were not equal to the white schools, and that segregation violated the so-called "equal protection clause" of the [14th Amendment](#), which holds that no state can "deny to any person within its jurisdiction the equal protection of the laws" (History 2009). The court case of Brown v. Board of Education of Topeka lasted from 1952 to 1954 and went to the United States Supreme Court. The court declared state laws establishing separate public schools for black and white students to be unconstitutional. Schools were required to be desegregated, as a result of this ruling.

In the Supreme Court decision, issued on May 17, 1954, Justice Earl Warren wrote that "in the field of public education the doctrine of 'separate but equal' has no place," as segregated schools are "inherently unequal." As a result, the Court ruled that the plaintiffs were being deprived of the equal protection of the laws guaranteed by the 14th Amendment. (USA Today, 2019).

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Lesson 10.3: Ethical or Unethical Practices in Testing

Ethical or Unethical Practices in Testing

Read the following sentences and decide if the action is ethical or unethical. Put an E beside those statements that you think are ethical and an U by those statements that you think are unethical.

1. Communicate to students, parents and the public what any test does and does not do, when and how it will be administered, and how the results may be appropriately used.
2. Incorporate all subject area objectives into the local curriculum throughout the year including, but not limited to, the objectives of the tests to be administered.
3. Reproduce test documents for any purpose.
4. Review skills, strategies, and concepts previously taught.
5. Teach and review test-taking and familiarization skills that include an understanding of test characteristics independent of the subject matter being tested.
6. Limit curriculum and instruction only to those skills, strategies, and concepts included on the test.
7. Use any test preparation documents and materials prepared by the test-maker, the Office of the Superintendent of Public Instruction or the Commission on Student Learning.
8. Read and discuss the test administration manual with colleagues.
9. Schedule and provide the appropriate amount of time needed for the assessment.
10. "Cram" test material just before the tests are given.
11. Take appropriate security precautions before, during and after administration of the test.
12. Define or pronounce words used in the test
13. Give "special help" of any kind to students taking the test.
14. Seek clarification on issues and questions from the administrative team responsible for ethical and appropriate practices.
15. Read any parts of the test to students except where indicated in the directions.
16. Suggest or "coach" students to mark or change their answers in any way.
17. Include all eligible students in the assessment.
18. Actively proctor students during tests, keeping them focused and on task.
19. Make comments of any kind during the test, including remarks about quality or quantity of student work, unless specifically called for in the administration manual.
20. Possess unauthorized copies of state tests.

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Lesson 10.4: References

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CHAPTER OVERVIEW

11: Standardized Assessments

Understanding standardized testing is very important for beginning teachers as K-12 teaching is increasingly influenced by the administration and results of standardized tests. Teachers also need to be able to help parents and students understand test results. Consider the following scenarios.

- *Vanessa, a newly licensed physical education teacher, is applying for a job at a middle school. During the job interview the principal asks how she would incorporate key sixth grade math skills into her PE and health classes as the sixth grade students in the previous year did not attain Adequate Yearly Progress in mathematics.*

- *Danielle, a first year science teacher in Ohio, is asked by Mr Volderwell, a recent immigrant from Turkey and the parent of a tenth grade son Marius, to help him understand test results.*

When Marius first arrived at school he took the Test of Cognitive Skills and scored on the eighty- fifth percentile whereas on the state Science Graduation test he took later in the school year he was classified as "proficient" .

- *James, a third year elementary school teacher, attends a class in gifted education over summer as standardized tests from the previous year indicated that while overall his class did well in reading the top 20 per cent of his students did not learn as much as expected.*

- *Miguel, a 1st grade student, takes two tests in fall and the results indicate that his grade equivalent scores are 3.3 for reading and 3.0 for math. William's parents want him immediately promoted into the second grade arguing that the test results indicate that he already can read and do math at the 3rd grade level. Greg, a first grade teacher explains to William's parents that a grade equivalent score of 3.3 does not mean William can do third grade work.*

Understanding standardized testing is difficult as there are numerous terms and concepts to master and recent changes in accountability under the *No Child Left Behind Act of 2001*(NCLB) have increased the complexity of the concepts and issues. In this chapter we focus on the information that beginning teachers need to know and start with some basic concepts.

[Lesson 11.1: Basic Concepts](#)

[Lesson 11.2: High-Stakes Testing by States](#)

[Lesson 11.3: Understanding Test Results](#)

[Lesson 11.4: Issues with Standardized Tests](#)

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Lesson 11.1: Basic Concepts

Standardized tests are created by a team— usually test experts from a commercial testing company who consult classroom teachers and university faculty— and are administered in standardized ways. Students not only respond to the same questions they also receive the same directions and have the same time limits. Explicit scoring criteria are used. Standardized tests are designed to be taken by many students within a state, province, or nation, and sometimes across nations. Teachers help administer some standardized tests and test manuals are provided that contain explicit details about the administration and scoring. For example, teachers may have to remove all the posters and charts from the classroom walls, read directions out loud to students using a script, and respond to student questions in a specific manner.

Criterion referenced standardized tests measure student performance against a specific standard or criterion. For example, newly hired firefighters in the Commonwealth of Massachusetts in the United States have to meet physical fitness standards by successfully completing a standardized physical fitness test that includes stair climbing, using a ladder, advancing a hose, and simulating a rescue through a doorway (Human Resources Division, nod.). Criterion referenced tests currently used in US schools are often tied to state content standards and provide information about what students can and cannot do. For example, one of the content standards for fourth grade reading in Kentucky is "Students will identify and describe the characteristics of fiction, nonfiction, poetry or plays" (Combined Curriculum Document Reading 4.1, 2006) and so a report on an individual student would indicate if the child can accomplish this skill. The report may state that number or percentage of items that were successfully completed (e.g. 15 out of 20, i.e. 75 per cent) or include descriptions such as basic, proficient, or advanced which are based on decisions made about the percent of mastery necessary to be classified into these categories.

Norm referenced standardized tests report students' performance relative to others. For example, if a student scores on the seventy-second percentile in reading it means she outperforms 72 percent of the students who were included in the test's norm group. A norm group is a representative sample of students who completed the standardized test while it was being developed. For state tests the norm group is drawn from the state whereas for national tests the sample is drawn from the nation. Information about the norm groups is provided in a technical test manual that is not typically supplied to teachers but should be available from the person in charge of testing in the school district.

Reports from criterion and norm referenced tests provide different information. Imagine a nationalized mathematics test designed to basic test skills in second grade. If this test is norm referenced, and Alisha receives a report indicating that she scored in the eighty-fifth percentile this indicates that she scored better than 85 per cent of the students in the norm group who took the test previously. If this test is criterion-referenced Alisha's report may state that she mastered 65 per cent of the problems designed for her grade level. The relative percentage reported from the norm-referenced test provides information about Alisha's performance compared to other students whereas the criterion referenced test attempts to describe what Alisha or any student can or cannot do with respect to whatever the test is designed to measure. When planning instruction classroom teachers need to know what students can and cannot do so criterion referenced tests are typically more useful (Popham, 2004). The current standard-based accountability and NCLB rely predominantly on criterion based tests to assess attainment of content-based standards. Consequently the use of standardized norm referenced tests in schools has diminished and is largely limited to diagnosis and placement of children with specific cognitive disabilities or exceptional abilities (Haertel & Herman, 2005).

Some recent standardized tests can incorporate both criterion-referenced and norm referenced elements in to the same test (Linn & Miller, 2005). That is, the test results not only provide information on mastery of a content standard but also the percentage of students who attained that level of mastery.

Standardized tests can be high stakes i.e. performance on the test has important consequences. These consequences can be for students, e.g. passing a high school graduation test is required in order to obtain a diploma or passing PRAXIS II is a prerequisite to gain a teacher license. These consequences can be for schools, e.g. under NCLB an increasing percentage of students in every school must reach proficiency in math and reading each year. Consequences for schools who fail to achieve these gains include reduced funding and restructuring of the school building. Under NCLB, the consequences are designed to be for the schools not individual students (Popham, 2005) and their test results may not accurately reflect what they know because students may not try hard when the tests have low stakes for them (Wise & DeMars, 2005).

Uses of standardized tests

Standardized tests are used for a variety of reasons and the same test is sometimes used for multiple purposes.

Assessing students' progress in a wider context

Well-designed teacher assessments provide crucial information about each student's achievement in the classroom. However, teachers vary in the types of assessment they use so teacher assessments do not usually provide information on how students' achievement compares to externally established criteria. Consider two eighth grade students, Brian and Joshua, who received As in their middle school math classes. However, on the standardized norm referenced math test Brian scored in the fiftieth percentile whereas Joshua scored in the ninetieth percentile. This information is important to Brian and Joshua, their parents, and the school personnel. Likewise, two third grade students could both receive Cs on their report card in reading but one may pass 25 percent and the other 65 per cent of the items on the Criterion Referenced State Test.

There are many reasons that students' performance on teacher assessments and standardized assessments may differ. Students may perform lower on the standardized assessment because their teachers have easy grading criteria, or there is poor alignment between the content they were taught and that on the standardized test, or they are unfamiliar with the type of items on the standardized tests, or they have test anxiety, or they were sick on the day of the test. Students may perform higher on the standardized test than on classroom assessments because their teachers have hard grading criteria, or the student does not work consistently in class (e.g. does not turn in homework) but will focus on a standardized test, or the student is adept at the multiple choice items on the standardized tests but not at the variety of constructed response and performance items the teacher uses. We should always be very cautious about drawing inferences from one kind of assessment.

In some states, standardized achievement tests are required for home-schooled students in order to provide parents and state officials information about the students' achievement in a wider context. For example, in New York home-schooled students must take an approved standardized test every other year in grades four through eight and every year in grades nine through twelve. These tests must be administered in a standardized manner and the results filed with the Superintendent of the local school district. If a student does not take the tests or scores below the thirty-third percentile the home schooling program may be placed on probation (New York State Education Department, 2005).

Diagnosing student's strengths and weaknesses

Standardized tests, along with interviews, classroom observations, medical examinations, and school records are used to help diagnose students' strengths and weaknesses. Often the standardized tests used for this purpose are administered individually to determine if the child has a disability. For example, if a kindergarten child is having trouble with oral communication, a standardized language development test could be administered to determine if there are difficulties with understanding the meaning of words or sentence structures, noticing sound differences in similar words, or articulating words correctly (Peirangelo & Guiliani, 2002). It would also be important to determine if the child was a recent immigrant, had a hearing impairment or mental retardation. The diagnosis of learning disabilities typically involves the administration of at least two types of standardized tests—an aptitude test to assess general cognitive functioning and an achievement test to assess knowledge of specific content areas (Peirangelo & Guiliani, 2006). We discuss the difference between aptitude and achievement tests later in this chapter.

Selecting students for specific programs

Standardized tests are often used to select students for specific programs. For example, the SAT (Scholastic Assessment Test) and ACT (American College Test) are norm referenced tests used to help determine if high school students are admitted to selective colleges. Norm referenced standardized tests are also used, among other criteria, to determine if students are eligible for special education or gifted and talented programs. Criterion referenced tests are used to determine which students are eligible for promotion to the next grade or graduation from high school. Schools that place students in ability groups including high school college preparation, academic, or vocational programs may also use norm referenced or criterion referenced standardized tests. When standardized tests are used as an essential criteria for placement they are obviously high stakes for students.

Assisting teachers' planning

Norm referenced and criterion referenced standardized tests, among other sources of information about students, can help teachers make decisions about their instruction. For example, if a social studies teacher learns that most of the students did very well on a norm referenced reading test administered early in the school year he may adapt his instruction and use additional primary sources. A reading teacher after reviewing the poor end-of-the-year criterion referenced standardized reading test results may decide that next year she will modify the techniques she uses. A biology teacher may decide that she needs to spend more time on genetics as her students scored poorly on that section of the standardized criterion referenced science test. These are examples of assessment for learning which involves data-based decision making. It can be difficult for beginning teachers to learn to use standardized test information appropriately, understanding that test scores are important information but also remembering that there are multiple reasons for students' performance on a test.

Accountability

Standardized tests results are increasingly used to hold teachers and administrators accountable for students' learning. Prior to 2002, many States required public dissemination of students' progress but under NCLB school districts in all states are required to send report cards to parents and the public that include results of standardized tests for each school. Providing information about students' standardized tests is not new as newspapers began printing summaries of students' test results within school districts in the 1970s and 1980s (Popham, 2005). However, public accountability of schools and teachers has been increasing in the US and many other countries and this increased accountability impacts the public perception and work of all teachers including those teaching in subjects or grade levels not being tested.

For example, Erin, a middle school social studies teacher, said:

"As a teacher in a 'non-testing' subject area, I spend substantial instructional time supporting the standardized testing requirements. For example, our school has instituted 'word of the day', which encourages teachers to use, define, and incorporate terminology often used in the tests (e.g. "compare", "oxymoron" etc.). I use the terms in my class as often as possible and incorporate them into written assignments. I also often use test questions of similar formats to the standardized tests in my own subject assessments (e.g. multiple choice questions with double negatives, short answer and extended response questions) as I believe that practice in the test question formats will help students be more successful in those subjects that are being assessed."

Accountability and standardized testing are two components of Standards Based Reform in Education that was initiated in the USA in 1980s. The two other components are academic content standards which are described later in this chapter and teacher quality which was discussed in Chapter 1.

Types of standardized tests

Achievement tests

Summarizing the past: K-12 achievement tests are designed to assess what students have learned in a specific content area. These tests include those specifically designed by states to assess mastery of state academic content standards (see more details below) as well as general tests such as the California Achievement Tests, The Comprehensive Tests of Basic Skills, Iowa Tests of Basic Skills, Metropolitan Achievement Tests, and the Stanford Achievement Tests. These general tests are designed to be used across the nation and so will not be as closely aligned with state content standards as specifically designed tests. Some states and Canadian Provinces use specifically designed tests to assess attainment of content standards and also a general achievement test to provide normative information.

Standardized achievement tests are designed to be used for students in kindergarten through high school. For young children questions are presented orally, and students may respond by pointing to pictures, and the subtests are often not timed. For example, on the Iowa Assessments (<https://info.riversideinsights.com/iowa-assessments>) designed for students as young as kindergarten the vocabulary test assesses listening vocabulary. The teacher reads a word and may also read a sentence containing the word. Students are then asked to choose one of three pictorial response options.

Achievement tests are used as one criterion for obtaining a license in a variety of professions including nursing, physical therapy, and social work, accounting, and law. Their use in teacher education is recent and is part of the increased accountability of public education and most States require that teacher education students take achievement tests in order to obtain a teaching license. For

those seeking middle school and high school licensure these are tests are in the content area of the major or minor (e.g. mathematics, social studies); for those seeking licenses in early childhood and elementary the tests focus on knowledge needed to teach students of specific grade levels. The most commonly used tests, the PRAXIS series, tests I and II, developed by Educational Testing Service, include three types of tests (www.ets.org):

- Subject Assessments, these test on general and subject-specific teaching skills and knowledge. They include both multiple-choice and constructed-response test items.
- Principles of Learning and Teaching (PLT) Tests assess general pedagogical knowledge at four grade levels: Early Childhood, K-6, 5-9, and 7-12. These tests are based on case studies and include constructed-response and multiple-choice items. Much of the content in this textbook is relevant to the PLT tests.
- Teaching Foundations Tests assess pedagogy in five areas: multi-subject (elementary), English, Language Arts, Mathematics, Science, and Social Science.

These tests include constructed-response and multiple-choice items which tests teacher education students. The scores needed in order to pass each test vary and are determined by each state.

Diagnostic tests

Profiling skills and abilities: Some standardized tests are designed to diagnose strengths and weaknesses in skills, typically reading or mathematics skills. For example, an elementary school child may have difficulty in reading and one or more diagnostic tests would provide detailed information about three components: (1) word recognition, which includes phonological awareness (pronunciation), decoding, and spelling; (2) comprehension which includes vocabulary as well as reading and listening comprehension, and (3) fluency (Joshi 2003). Diagnostic tests are often administered individually by school psychologists, following standardized procedures. The examiner typically records not only the results on each question but also observations of the child's behavior such as distractibility or frustration. The results from the diagnostic standardized tests are used in conjunction with classroom observations, school and medical records, as well as interviews with teachers, parents and students to produce a profile of the student's skills and abilities, and where appropriate diagnose a learning disability.

Aptitude tests

Predicting the future: Aptitude tests, like achievement tests, measure what students have learned, but rather than focusing on specific subject matter learned in school (e.g. math, science, English or social studies), the test items focus on verbal, quantitative, problem solving abilities that are learned in school or in the general culture (Linn & Miller, 2005). These tests are typically shorter than achievement tests and can be useful in predicting general school achievement. If the purpose of using a test is to predict success in a specific subject (e.g. language arts) the best prediction is past achievement in language arts and so scores on a language arts achievement test would be useful. However when the predictions are more general (e.g. success in college) aptitude tests are often used. According to the test developers, both the ACT and SAT Reasoning tests, used to predict success in college, assess general educational development and reasoning, analysis and problem solving as well as questions on mathematics, reading and writing (<http://www.collegeboard.com> : <http://www.act.org/>). The SAT Subject Tests that focus on mastery of specific subjects like English, history, mathematics, science, and language are used by some colleges as entrance criteria and are more appropriately classified as achievement tests than aptitude tests even though they are used to predict the future.

Tests designed to assess general learning ability have traditionally been called Intelligence Tests but are now often called learning ability tests, cognitive ability tests, scholastic aptitude tests, or school ability tests. The shift in terminology reflects the extensive controversy over the meaning of the term intelligence and that its traditional use was associated with inherited capacity (Linn & Miller 2005). The more current terms emphasize that tests measure developed ability in learning not innate capacity. The Cognitive Abilities Test assesses K-12 students' abilities to reason with words, quantitative concepts, and nonverbal (spatial) pictures. The Woodcock Johnson III contains cognitive abilities tests as well as achievement tests for ages 2 to 90 years (<http://www.riverpub.com>).

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Lesson 11.2: High-Stakes Testing by States

While many States had standardized testing programs prior to 2000, the number of state-wide tests has grown enormously since then because NCLB required that all states test students in reading and mathematics annually in grades third through eighth and at least once in high school by 2005-6. Twenty-three states expanded their testing programs during 2005-6 and additional tests are being added as testing in science is required by 2007-8. Students with disabilities and English language learners must be included in the testing and provided a variety of accommodations so the majority of staff in school districts are involved in testing in some way (Olson, 2005). In this section we focus on these tests and their implications for teachers and students.

Standards based assessment Academic content standards

NCLB mandates that states must develop academic content standards that specify what students are expected to know or be able to do at each grade level. These content standards used to be called goals and objectives and it is not clear why the labels have changed (Popham, 2004). Content standards are not easy to develop— if they are too broad and not related to grade level, teachers cannot hope to prepare students to meet the standards.

An example, a broad standard in reading is:

"Students should be able to construct meaning through experiences with literature, cultural events and philosophical discussion" (no grade level indicated). (American Federation of Teachers, 2006, p. 6).

Standards that are too narrow can result in a restricted curriculum. An example of a narrow standard might be:

Students can define, compare and contrast, and provide a variety of examples of synonyms and antonyms.

A stronger standard is:

"Students should apply knowledge of word origins, derivations, synonyms, antonyms, and idioms to determine the meaning of words (grade 4) (American Federation of Teachers, 2006, p. 6).

The American Federation of Teachers conducted a study in 2005-6 and reported that some of the standards in reading, math and science were weak in 32 states. States set the strongest standards in science followed by mathematics. Standards in reading were particularly problematic and with one-fifth of all reading standards redundant across the grade levels, i.e. word-by-word repetition across grade levels at least 50 per cent of the time (American Federation of Teachers, 2006).

Even if the standards are strong, there are often so many of them that it is hard for teachers to address them all in a school year. Content standards are developed by curriculum specialists who believe in the importance of their subject area so they tend to develop large numbers of standards for each subject area and grade level. At first glance, it may appear that there are only several broad standards, but under each standard there are subcategories called goals, benchmarks, indicators or objectives (Popham, 2004). For example, Idaho's first grade mathematics standard, judged to be of high quality (AFT 2000) contains five broad standards, including 10 goals and a total of 29 objectives (Idaho Department of Education, 2005-6).

Alignment of standards, testing and classroom curriculum

The state tests must be aligned with strong content standards in order to provide useful feedback about student learning. If there is a mismatch between the academic content standards and the content that is assessed then the test results cannot provide information about students' proficiency on the academic standards. A mismatch not only frustrates the students taking the test, teachers, and administrators it undermines the concept of accountability and the "theory of action" (See box "Deciding for yourself about the research") that underlies the NCLB. Unfortunately, the 2006 Federation of Teachers study indicated that in only 11 states were all the tests aligned with state standards (American Federation of Teachers, 2006).

State standards and their alignment with state assessments should be widely available— preferably posted on the states websites so they can be accessed by school personnel and the public. A number of states have been slow to do this. Table 43 summarizes which states had strong content standards, tests that were aligned with state standards, and adequate documents on online. Only 11 states were judged to meet all three criteria in 2006.

Table **Lesson11.2.1** : Strong content standards, alignment, and transparency: evaluation for each state in 2006 (Adapted from American Federation of Teachers, 2006).

State	Standards are strong	Test documents match standards	Testing documents online
Alabama			+
Alaska		+	+
Arizona		+	+
Arkansas		+	
California	+	+	+
Colorado			
Connecticut			
Delaware		+	
District of Columbia	+	+	
Florida		+	+
Georgia	+		+
Hawaii		+	
Idaho	+		
Illinois			+
Indiana		+	+
Iowa		+	
Kansas		+	+
Kentucky		+	+
Louisiana	+	+	+
Maine		+	
Maryland		+	
Massachusetts	+	+	
Michigan	+	+	
Minnesota		+	+
Mississippi			+
Missouri			
Montana			
Nebraska			
Nevada	+	+	+
New Hampshire		+	+
New Jersey	+		
New Mexico	+	+	+
New York	+	+	+

State	Standards are strong	Test documents match standards	Testing documents online
North Carolina	+		
North Dakota	+	+	
Ohio	+	+	+
Oklahoma		+	+
Oregon		+	+
Pennsylvania			+
Rhode Island		+	+
South Carolina			
South Dakota	+		+
Tennessee	+	+	+
Texas		+	+
Utah			+

Sampling content

When numerous standards have been developed it is impossible for tests to assess all of the standards every year, so the tests *sample* the content, i.e. measure some but not all the standards every year. Content standards cannot be reliably assessed with only one or two items so the decision to assess one content standard often requires not assessing another. This means if there are too many content standards a significant proportion of them are not measured each year. In this situation, teachers try to guess which content standards will be assessed that year and align their teaching on those specific standards. Of course if these guesses are incorrect students will have studied content not on the test and not studied content that is on the test. Some argue that this is a very serious problem with current state testing and Popham (2004) an expert on testing even said: "What a muddleheaded way to run a testing program." (p. 79)

Adequate Yearly Progress (AYP)

Under NCLB three levels of achievement, basic, proficient and advanced, must be specified for each grade level in each content area by each state. States were required to set a time table from 2002 that insured an increasing percentage of students would reach the proficient levels such that by 2013-14, *so every* child is performing at or the proficient level. Schools and school districts who meet this timetable are said to meet adequate yearly progress (AYP).

Because every child must reach proficiency by 2013-14 greater increases are required for those schools that had larger percentages of initially lower performing students.

Exhibit **Lesson11.2.1** illustrates the progress needed in three hypothetical schools. School A, initially the lowest performing school, has to increase the number of students reaching proficiency by an average of 6 per cent each year, the increase is 3 per cent for School B, and the increase is only 1 per cent for School C. Also, the checkpoint targets in the timetables are determined by the lower performing schools. This is illustrated on the figure by the arrow— it is obvious that School A has to make significant improvements by 2007-8 but School C does not have to improve at all by 2007-8. This means that schools that are initially lower performing are much more likely to fail to make AYP during the initial implementation years of NCLB.

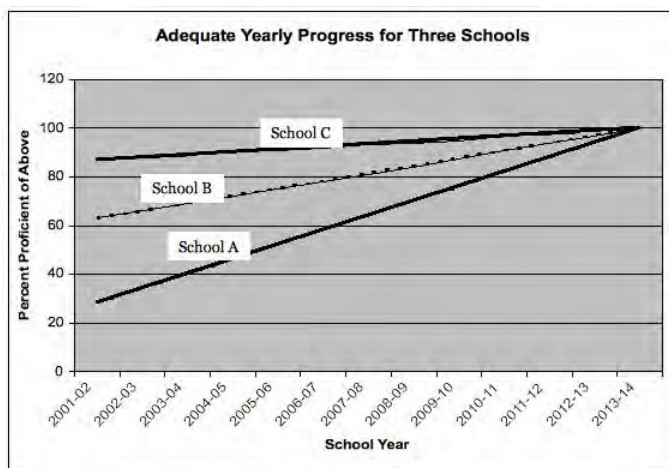


Exhibit **Lesson11.2.1**: Adequate Yearly Progress requires greater student improvement in schools with lower levels of initial proficiency (CC-BY-NC; K. Siefert, R. Sutton via [Educational Psychology](#))

Schools A, B and C all must reach 10 per cent student proficiency by 2013-4. However the school that initially has the lowest level of performance (A) has to increase the percentage of students proficient at a greater rate than schools with middle (B) or high (C) levels of initial proficiency rates.

Subgroups

For a school to achieve AYP not only must overall percentages of the students reach proficiency but subgroups must also reach proficiency in a process called desegregation. Prior to NCLB state accountability systems typically focused on overall student performance but this did not provide incentives for schools to focus on the neediest students, e.g. those children living below the poverty line (Hess & Petrilli, 2006). Under NCLB the percentages for each racial/ethnic group in the school (white, African American, Latino, Native American etc.), low income students, students with limited English proficiency, and students with disabilities are all calculated if there are enough students in the subgroup. A school may fail AYP if one group, e.g. English language learners do not make adequate progress. This means that it is more difficult for large diverse schools (typically urban schools) that have many subgroups to meet the demands of AYP than smaller schools with homogeneous student body (Novak & Fuller, 2003). Schools can also fail to make AYP if too few students take the exam. The drafters of the law were concerned that some schools might encourage low-performing students to stay home on the days of testing in order to artificially inflate the scores. So on average at least 95 per cent of any subgroup must take the exams each year or the school may fail to make AYP (Hess & Petrilli, 2006).

Sanctions

Schools failing to meet AYP for consecutive years, experience a series of increasing sanctions. If a school fails to make AYP for two years in row it is labeled "in need of improvement" and school personnel must come up with a school improvement plan that is based on "scientifically based research". In addition, students must be offered the option of transferring to a better performing public school within the district. If the school fails for three consecutive years, free tutoring must be provided to needy students. A fourth year of failure requires "corrective actions" which may include staffing changes, curriculum reforms or extensions of the school day or year. If the school fails to meet AYP for five consecutive years the district must "restructure" which involves major actions such as replacing the majority of the staff, hiring an educational management company, turning the school over to the state.

Growth or value added models

One concern with how AYP is calculated is that it is based on an absolute level of student performance at one point in time and does not measure how much students improve during each year. To illustrate this, Exhibit **Lesson11.2.2** shows six students whose science test scores improved from fourth to fifth grade. The circle represents a student's score in fourth grade and the tip of the arrow the test score in fifth grade. Note that students 1, 2, and 3 all reach the level of proficiency (the horizontal dotted line) but students 4, 5 and 6 do not. However, also notice that students 2, 5 and 6 improved much more than students 1, 3, and 4. The current system of AYP rewards students reaching the proficiency level rather than students' growth. This is a particular problem for low

performing schools who may be doing an excellent job of improving achievement (students 5 and 6) but do not make the proficiency level. The US Department of Education in 2006 allowed some states to include growth measures into their calculations of AYP. While growth models traditionally tracked the progress of individual students, the term is sometimes used to refer to growth of classes or entire schools (Shaul, 2006).

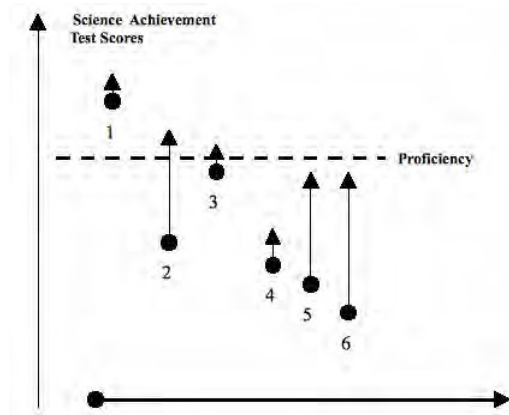


Exhibit **Lesson11.2.2**: An illustration of value added vs proficiency

approach to assessment. Each arrow represents the mathematics achievement results of one student who was tested in the fourth grade (shown by the dot) and also the fifth grade (shown by the tip of the arrow). (CC-BY-NC; K. Siefert, R. Sutton via [Educational Psychology](#))

Some states include growth information on their report cards. For example, Tennessee (www.k-12.state.tn.us/rptcrdof/) provides details on which schools meet the AYP but also whether the students' scores on tests represent average growth, above average, or below average growth within the state. Exhibit **Lesson11.2.3** illustrates in a simple way the kind of information that is provided. Students in schools A, B, and C all reached proficiency and AYP but in Schools D, E, and F did not. However, students in schools A and D had low growth, in schools B and E average growth, in schools C and F high growth. Researchers have found that in some schools students have high levels of achievement but do not grow as much as expected (School A), and also that in some schools, the achievement test scores are not high but the students are growing or learning a lot (School F). These are called "school effects" and represent the effect of the school on the learning of the students.

Exhibit **Lesson11.2.3**: Proficiency and growth information. (CC-BY-NC; K. Siefert, R. Sutton via [Educational Psychology](#))

Achievement	School A	School B	School C
	School D	School E	School F
	Low growth	Average Growth	High growth
		Proficiency	

Growth over one year

Schools can vary on overall school achievement (proficiency) as well as the amount of growth in student learning. For example schools A, B, and C all have high achievement levels but only in School C do students have, on average, high growth. Schools D, C, and F all have low levels of proficiency but only in school D do students, on average, have low growth.

Growth models have intuitive appeal to teachers as they focus on how much a student learned during the school year— not what the student knew at the start of the school year. The current research evidence suggests that teachers matter a lot— i.e. students learn much more with some teachers than others. For example, in one study low-achieving fourth grade students in Dallas, Texas were followed for three years and 90 per cent of those who had effective teachers passed the seventh grade math test whereas only 42 per cent of those with ineffective teachers passed (cited in Bracey, 2004). Unfortunately, the same study reported that low achieving students were more likely to be assigned to ineffective teachers for three years in a row than high achieving students. Some policy makers believe that teachers who are highly effective should receive rewards including higher salaries or bonuses and that a primary criterion of effectiveness is assessed by growth models, i.e. how much students learn during a year (Hershberg, 2004). However, using growth data to make decisions about teachers is controversial as there is much more statistical uncertainty

when using growth measures for a small group or students (e.g. one teacher's students) than larger groups (e.g. all fourth graders in a school district).

Growth models are also used to provide information about the patterns of growth among subgroups of students that may arise from the instructional focus of the teachers. For example, it may be that highest performing students in the classroom gain the most and the lowest performing students gain the least. This suggests that the teacher is focusing on the high achieving students and giving less attention to low achieving students. In contrast, it may be the highest performing students gain the least and the low performing students grow the most suggesting the teacher focuses on the low performing students and paying little attention to the high performing students. If the teacher focuses on the students "in the middle" they may grow the most and the highest and lowest performing students grow the least. Proponents of the value-added or growth models argue that teachers can use this information to help them make informed decisions about their teaching (Hershberg, 2004).

Differing state standards

Under NCLB each state devises their own academic content standards, assessments, and levels of proficiency. Some researchers have suggested that the rules of NCLB have encouraged states to set low levels of proficiency so it is easier to meet AYP each year (Hoff, 2002). Stringency of state levels of proficiency can be examined by comparing state test scores to scores on a national achievement test called the National Assessment of Educational Progress (NAEP). NCLB requires that states administer reading and math NAEP tests to a sample of fourth and eighth grade students every other year. The NAEP is designed to assess the progress of students at the state-wide or national level not individual schools or students and is widely respected as a well designed test that uses current best practices in testing. A large percentage of each test includes constructed-response questions and questions that require the use of calculators and other materials (<http://nces.ed.gov/nationsreportcard>).

Exhibit **Lesson11.2.4** illustrates that two states, Colorado and Missouri had very different state performance standards for the fourth grade reading/language arts tests in 2003. On the state assessment 67 per cent of the students in Colorado but only 21 per cent of the students in Missouri were classified as proficient. However, on the NAEP tests 34 per cent of Colorado students and 28 per cent of Missouri students were classified as proficient (Linn 2005). These differences demonstrate that there is no common meaning in current definitions of "proficient achievement" established by the states.

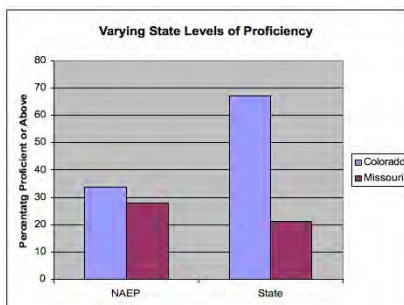


Exhibit **Lesson11.2.4**: Relationship between state proficiency levels and scores on NAEP

(Adapted from Linn 2005).

Implications for beginning teachers

Dr Mucci is the principal of a suburban fourth through sixth grade school in Ohio that continues to meet AYP. We asked her what beginning teachers should know about high stakes testing by the states. "I want beginning teachers to be familiar with the content standards in Ohio because they clearly define what all students should know and be able to do. Not only does teaching revolve around the standards, I only approve requests for materials or professional development if these are related to the standards. I want beginning teachers to understand the concept of data-based decision making. Every year I meet with all the teachers in each grade level (e.g. fourth grade) to look for trends in the previous year's test results and consider remedies based on these trends. I also meet with each teacher in the content areas that are tested and discuss every student's achievement in his or her class so we can develop an instructional plan for every student. All interventions with students are research based. Every teacher in the school is responsible for helping to implement these instructional plans, for example the music or art teachers must incorporate some reading and math into their classes. I also ask all teachers to teach test taking skills, by using similar formats to the state tests, enforcing time limits, making sure students learn to distinguish between questions that required an extended response using complete sentences versus

those that only requires one or two words, and ensuring that students answer what is actually being asked. We begin this early in the school year and continue to work on these skills, so by spring, students are familiar with the format, and therefore less anxious about the state test. We do everything possible to set each student up for success."

The impact of testing on classroom teachers does not just occur in Dr Mucci's middle school. A national survey of over 4,000 teachers indicated that the majority of teachers reported that the state mandated tests were compatible with their daily instruction and were based on curriculum frameworks that all teachers should follow. The majority of teachers also reported teaching test taking skills and encouraging students to work hard and prepare. Elementary school teachers reported greater impact of the high stakes tests: 56 per cent reported the tests influenced their teaching daily or a few times a week compared to 46 per cent of middle school teacher and 28 per cent of high school teachers. Even though the teachers had adapted their instruction because of the standardized tests they were skeptical about them with 40 per cent reporting that teachers had found ways to raise test scores without improving student learning and over 70 per cent reporting that the test scores were not an accurate measure of what minority students know and can do (Pedulla, Abrams, Madaus, Russell, Ramos, & Miao; 2003).

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Lesson 11.3: Understanding Test Results

In order to understand test results from standardized tests it is important to be familiar with a variety of terms and concepts that are fundamental to "measurement theory", the academic study of measurement and assessment. Two major areas in measurement theory, reliability and validity, were discussed in the previous chapter; in this chapter we focus on concepts and terms associated with test scores.

The basics

Frequency distributions

A frequency distribution is a listing of the number of students who obtained each score on a test. If 31 students take a test, and the scores range from 11 to 30 then the frequency distribution might look like Table **Lesson11.3.1**. We also show the same set of scores on a histogram or bar graph in Exhibit **Lesson11.3.1**. The horizontal (or x axis) represents the score on the test and the vertical axis (y axis) represents the number or frequency of students. Plotting a frequency distribution helps us see what scores are typical and how much variability there are in the scores. We describe more precise ways of determining typical scores and variability next.

Table **Lesson11.3.1**: Frequency distribution for 30 scores

Score on test	Frequency	Central tendency measures
17	1	
18	1	
19	0	
20	3	
21	2	
22	6	Mode
23	3	Median
24	2	Mean
25	0	
26	2	
27	6	Mode
28	2	
29	2	
30	1	
TOTAL	31	

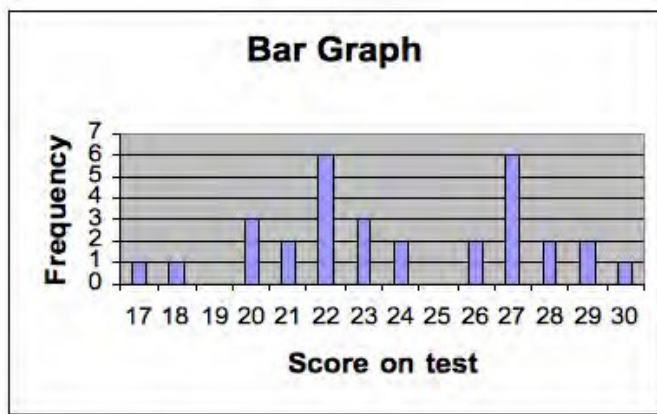


Exhibit **Lesson11.3.1**: Tests scores from **Lesson11.3.1** represented as a bar graph. (CC-BY-NC; K. Siefert, R. Sutton via [Educational Psychology](#))

Central tendency and variability

There are three common ways of measuring central tendency or which score(s) are typical. The *mean* is calculated by adding up all the scores and dividing by the number of scores. In the example in Table **Lesson11.3.1**, the mean is 24. The *median* is the "middle" score of the distribution—that is half of the scores are above the median and half are below. The median on the distribution is 23 because 15 scores are above 23 and 15 are below. The *mode* is the score that occurs most often. In Table **Lesson11.3.1** there are actually two modes 22 and 27 and so this distribution is described as bimodal. Calculating the mean, median and mode are important as each provides different information for teachers. The median represents the score of the "middle" students, with half scoring above and below, but does not tell us about the scores on the test that occurred most often. The mean is important for some statistical calculations but is highly influenced by a few extreme scores (called outliers) but the median is not. To illustrate this, imagine a test out of 20 points taken by 10 students, and most do very well but one student does very poorly. The scores might be 4, 18, 18, 19, 19, 19, 19, 19, 20, 20. The mean is 17.5 (170/10) but if the lowest score (4) is eliminated the mean is now is 1.5 points higher at 19 (171/9). However, in this example the median remains at 19 whether the lowest score is included. When there are some extreme scores the median is often more useful for teachers in indicating the central tendency of the frequency distribution.

The measures of central tendency help us summarize scores that are representative, but they do not tell us anything about how variable or how spread out are the scores. Exhibit **Lesson11.3.2** illustrates sets of scores from two different schools on the same test for fourth graders. Note that the mean for each is 40 but in School A the scores are much less spread out. A simple way to summarize variability is the **range**, which is the lowest score subtracted from the lowest score. In School A with low variability the range is $(45 - 35) = 10$; in the school B the range is $(55 - 22) = 33$.

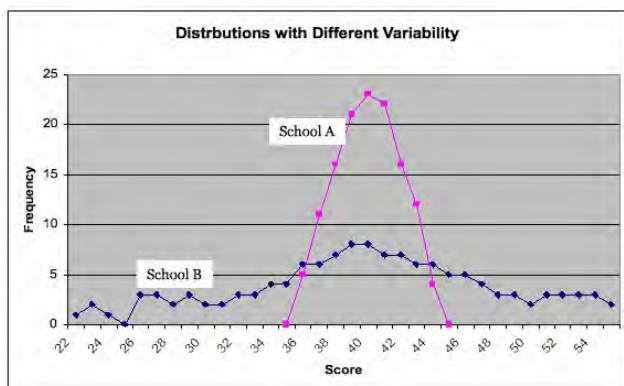


Exhibit **Lesson11.3.2**: Fourth grade math scores in two different schools with the same mean but different variability. (CC-BY-NC; K. Siefert, R. Sutton via [Educational Psychology](#))

However, the range is only based on two scores in the distribution, the highest and lowest scores, and so does not represent variability in all the scores. The **standard deviation** is based on how much, on average, all the scores deviate from the mean. In the example in Exhibit 17 the standard deviations are 7.73 for School A and 2.01 for School B. In the exercise below we demonstrate how to calculate the standard deviation.

Calculating a standard deviation

Example: The scores from 11 students on a quiz are 4, 7, 6, 3, 10, 7, 3, 7, 5, 5, and 9

1. Order scores.
2. Calculate the mean score.
3. Calculate the deviations from the mean.
4. Square the deviations from the mean.
5. Calculate the mean of the squared deviations from the mean (i.e. sum the squared deviations from the mean then divide by the number of scores). This number is called the variance.
6. Take the square root and you have calculated the standard deviation.

Score (Step 1, order)	Deviation from the mean	Squared deviation from the mean	
3	-3	9	
3	-3	9	
4	-2	4	(Step 4-5, complete the calculations)
5	-1	1	Formula:
5	-1	1	$\frac{\sqrt{\sum (Score - Mean)^2}}{N}$
6	0	0	N = Number of score
7	1	1	
7	1	1	
7	1	1	
9	3	9	
10	4	4	
TOTAL = 66		40	
(Step 2, calculate mean) MEAN 66/11= 6.0		(Step 3, calculate deviations) Mean= 40 /11= 3.64	(Step 6, find the standard deviation) Standard deviation= $\sqrt{3.64}$ = 1.91

The normal distribution

Knowing the standard deviation is particularly important when the distribution of the scores falls on a normal distribution. When a standardized test is administered to a very large number of students the distribution of scores is typically similar, with many students scoring close to the mean, and fewer scoring much higher or lower than the mean. When the distribution of scores looks like the bell shape shown in Exhibit **Lesson11.3.2** it is called a normal distribution. In the diagram we did not draw in the scores of individual students as we did in Exhibit **Lesson11.3.1**, because distributions typically only fall on a normal curve when there are a large number of students; too many to show individually. A normal distribution is symmetric, and the mean, median and mode are all the same.

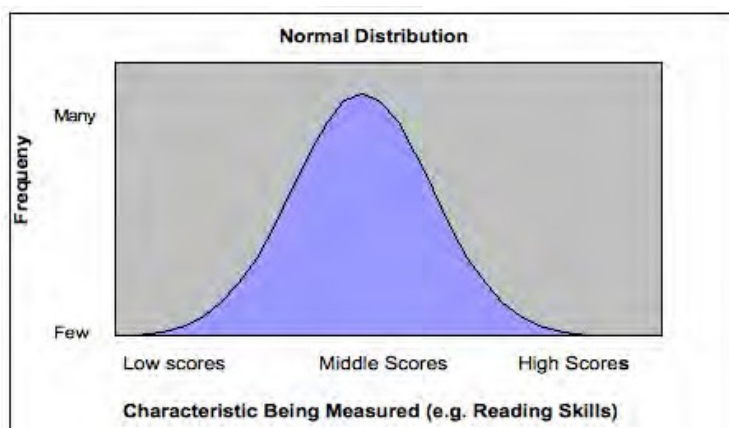


Figure **Lesson11.3.3**: Bell shaped curve of normal distribution. (CC-BY-NC; K. Siefert, R. Sutton via [Educational Psychology](#))

Normal curve distributions are very important in education and psychology because of the relationship between the mean, standard deviation, and percentiles. In all normal distributions 34 per cent of the scores fall between the mean and one standard deviation of the mean. Intelligence tests often are constructed to have a mean of 100 and standard deviation of 15 and we illustrate that in Exhibit **Lesson11.3.4**.

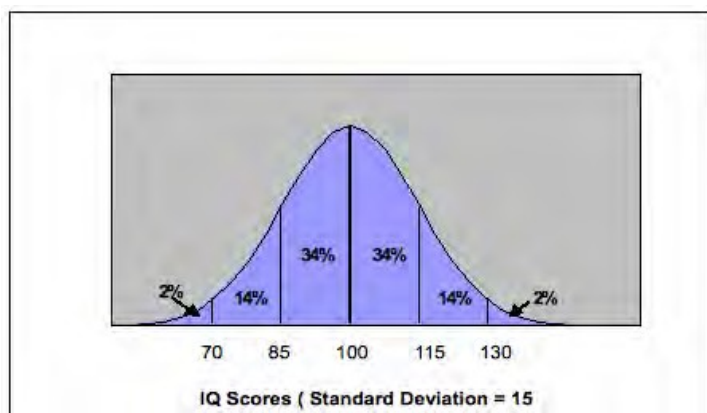


Figure **Lesson11.3.4**: Normal distribution for an IQ test with mean 100 and standard deviation 15. (CC-BY-NC; K. Siefert, R. Sutton via [Educational Psychology](#))

In this example, 34 per cent of the scores are between 100 and 115 and as well, 34 per cent of the scores lie between 85 and 100. This means that 68 per cent of the scores are between -1 and $+1$ standard deviations of the mean (i.e. 85 and 115). Note that only 14 per cent of the scores are between $+1$ and $+2$ standard deviations of the mean and only 2 per cent fall above $+2$ standard deviations of the mean.

In a normal distribution a student who scores the mean value is always in the fiftieth percentile because the mean and median are the same. A score of $+1$ standard deviation above the mean (e.g. 115 in the example above) is the 84 per cent tile (50 per cent and 34 per cent of the scores were below 115). In [Exhibit 14.2.1](#) we represented the percentile equivalents to the normal curve and we also showed standard scores.

Kinds of test scores

A **standard score** expresses performance on a test in terms of standard deviation units above or below the mean (Linn & Miller, 2005). There are a variety of standard scores:

Z-score: One type of standard score is a **z-score**, in which the mean is 0 and the standard deviation is 1. This means that a z-score tells us directly how many standard deviations the score is above or below the mean. For example, if a student receives a z score of 2 her score is two standard deviations above the mean or the eighty-fourth percentile. A student receiving a z score of -1.5 scored one and one half deviations below the mean. Any score from a normal distribution can be converted to a z score if the mean and standard deviation is known. The formula is:

$$Z_{score} = \frac{Score - Mean\ Score}{Standard\ Deviation} \quad (\text{Lesson 11.3.1})$$

So, if the score is 130 and the mean is 100 and the standard deviation is 15 then the calculation is

$$Z_{score} = \frac{130 - 100}{15} \quad (\text{Lesson 11.3.2})$$

If you look at Exhibit 15 you can see that this is correct—a score of 130 is 2 standard deviations above the mean and so the z score is 2.

T-score: A **T-score** has a mean of 50 and a standard deviation of 10. This means that a T-score of 70 is two standard deviations above the mean and so is equivalent to a z-score of 2.

Stanines: Stanines (pronounced staynines) are often used for reporting students' scores and are based on a standard nine point scale and with a mean of 5 and a standard deviation of 2. They are only reported as whole numbers and Figure 11-10 shows their relation to the normal curve.

Grade equivalent sores

A grade equivalent score provides an estimate of test performance based on grade level and months of the school year (Popham, 2005, p. 288). A grade equivalent score of 3.7 means the performance is at that expected of a third grade student in the seventh month of the school year. Grade equivalents provide a continuing range of grade levels and so can be considered developmental scores. Grade equivalent scores are popular and seem easy to understand however they are typically misunderstood. If, James, a fourth grade student, takes a reading test and the grade equivalent score is 6.0; *this does not mean that James can do sixth grade work*. It means that James performed on the *fourth grade test* as a sixth grade student is expected to perform. Testing companies calculate grade equivalents by giving one test to several grade levels. For example a test designed for fourth graders would also be given to third and fifth graders. The raw scores are plotted and a trend line is established and this is used to establish the grade equivalents.

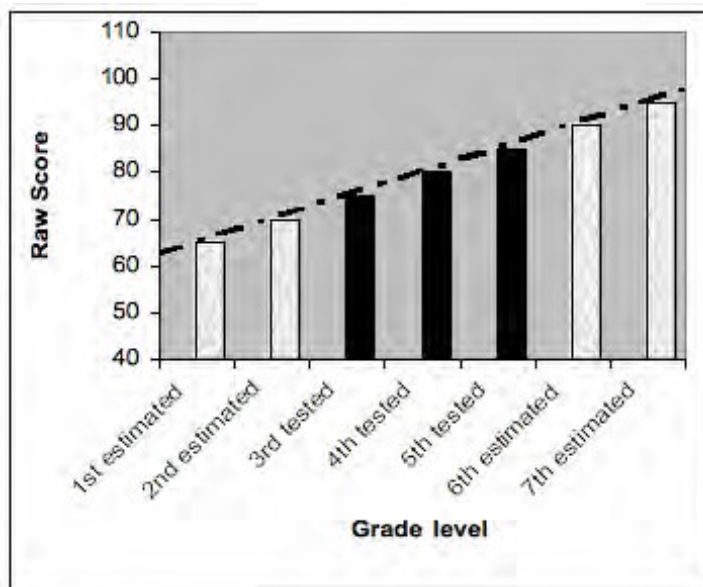


Figure **Lesson11.3.5:** Using trend lines to estimate grade equivalent scores. (CC-BY-NC; K. Siefert, R. Sutton via [Educational Psychology](#))

Grade equivalent scores also assume that the subject matter that is being tested is emphasized at each grade level to the same amount and that mastery of the content accumulates at a mostly constant rate (Popham, 2005). Many testing experts warn that grade equivalent scores should be interpreted with considerable skepticism and that parents often have serious misconceptions about grade equivalent scores. Parents of high achieving students may have an inflated sense of what their child's levels of achievement.

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Lesson 11.4: Issues with Standardized Tests

Many people have very strong views about the role of standardized tests in education. Some believe they provide an unbiased way to determine an individual's cognitive skills as well as the quality of a school or district. Others believe that scores from standardized tests are capricious, do not represent what students know, and are misleading when used for accountability purposes. Many educational psychologists and testing experts have nuanced views and make distinctions between the information standardized tests can provide about students' performances and how the tests results are interpreted and used. In this nuanced view, many of the problems associated with standardized tests arise from their high stakes use such as using the performance on one test to determine selection into a program, graduation, or licensure, or judging a school as high vs low performing.

Are standardized tests biased?

In a multicultural society one crucial question is: Are standardized tests biased against certain social class, racial, or ethnic groups? This question is much more complicated than it seems because bias has a variety of meanings. An everyday meaning of bias often involves the fairness of using standardized test results to predict potential performance of disadvantaged students who have previously had few educational resources. For example, should Dwayne, a high school student who worked hard but had limited educational opportunities because of the poor schools in his neighborhood and few educational resources in his home, be denied graduation from high school because of his score on one test. It was not his fault that he did not have the educational resources and if given a chance with a change his environment (e.g. by going to college) his performance may blossom. In this view, test scores reflect societal inequalities and can punish students who are less privileged, and are often erroneously interpreted as a reflection of a fixed inherited capacity. Researchers typically consider bias in more technical ways and three issues will be discussed: item content and format; accuracy of predictions, and stereotype threat.

Item content and format. Test items may be harder for some groups than others. An example of social class bias in a multiple choice item asked students the meaning of the term *field*. The students were asked to read the initial sentence in italics and then select the response that had the same meaning of field (Popham 2004, p. 24):

My dad's field is computer graphics.

- a. *The pitcher could field his position*
- b. *We prepared the field by plowing it*
- c. *The doctor examined my field of vision*
- d. *What field will you enter after college?*

Children of professionals are more likely to understand this meaning of field as doctors, journalists and lawyers have "fields", whereas cashiers and maintenance workers have jobs so their children are less likely to know this meaning of field. (The correct answer is D).

Testing companies try to minimize these kinds of content problems by having test developers from a variety of backgrounds review items and by examining statistically if certain groups find some items easier or harder. However, problems do exist and a recent analyses of the verbal SAT tests indicated that whites tend to scores better on easy items whereas African Americans, Hispanic Americans and Asian Americans score better on hard items (Freedle, 2002). While these differences are not large, they can influence test scores. Researchers think that the easy items involving words that are used in every day conversation may have subtly different meanings in different subcultures whereas the hard words (e.g. vehemence, sycophant) are not used in every conversation and so do not have these variations in meaning. Test format can also influence test performance. Females typically score better at essay questions and when the SAT recently added an essay component, the females overall SAT verbal scores improved relative to males (Hoover, 2006).

Accuracy of predictions

Standardized tests are used among other criteria to determine who will be admitted to selective colleges. This practice is justified by predictive validity evidence— i.e. that scores on the ACT or SAT are used to predict first year college grades. Recent studies have demonstrated that the predictions for black and Latino students are less accurate than for white students and that predictors for female students are less accurate than male students (Young, 2004). However, perhaps surprisingly the test scores tend to slightly over predict success in college for black and Latino students, i.e. these students are likely to attain lower freshman grade point

averages than predicted by their test scores. In contrast, test scores tend to slightly under predict success in college for female students, i.e. these students are likely to attain higher freshman grade point averages than predicted by their test scores. Researchers are not sure why there are differences in how accurately the SAT and ACT test predict freshman grades.

Stereotype threat

Groups that are negatively stereotyped in some area, such as women's performance in mathematics, are in danger of stereotype threat, i.e. concerns that others will view them through the negative or stereotyped lens (Aronson & Steele, 2005). Studies have shown that test performance of stereotyped groups (e.g. African Americans, Latinos, women) declines when it is emphasized to those taking the test that (a) the test is high stakes, measures intelligence or math and (b) they are reminded of their ethnicity, race or gender (e.g. by asking them before the test to complete a brief demographic questionnaire). Even if individuals believe they are competent, stereotype threat can reduce working memory capacity because individuals are trying to suppress the negative stereotypes. Stereotype threat seems particularly strong for those individuals who desire to perform well. Standardized test scores of individuals from stereotyped groups may significantly underestimate actual their competence in low- stakes testing situations.

Do teachers teach to the tests?

There is evidence that schools and teachers adjust the curriculum so it reflects what is on the tests and also prepares students for the format and types of items on the test. Several surveys of elementary school teachers indicated that more time was spent on mathematics and reading and less on social studies and sciences in 2004 than 1990 (Jerald, 2006). Principals in high minority enrollment schools in four states reported in 2003 they had reduced time spent on the arts. Recent research in cognitive science suggests that reading comprehension in a subject (e.g. science or social studies) requires that students understand a lot of vocabulary and background knowledge in that subject (Recht & Leslie, 1988). This means that even if students gain good reading skills they will find learning science and social studies difficult if little time has been spent on these subjects.

Taking a test with an unfamiliar format can be difficult so teachers help students prepare for specific test formats and items (e.g. double negatives in multiple choice items; constructed response). Earlier in this chapter a middle school teacher, Erin, and Principal Dr Mucci described the test preparation emphasis in their schools. There is growing concern that the amount of test preparation that is now occurring in schools is excessive and students are not being educated but trained to do tests (Popham, 2004).

Do students and educators cheat?

It is difficult to obtain good data on how widespread cheating is but we know that students taking tests cheat and others, including test administrators, help them cheat (Cizek, 2003; Popham 2006). Steps to prevent cheating by students include protecting the security of tests, making sure students understand the administration procedures, preventing students from bringing in their notes or unapproved electronic devices as well as looking at each others answers. Some teachers and principals have been caught using unethical test preparation practices such as giving actual test items to students just before the tests, giving students more time than is allowed, answering students' questions about the test items, and actually changing students' answers (Popham, 2006). Concerns in Texas about cheating led to the creation of an independent task force in August 2006 with 15 staff members from the Texas Education Agency assigned investigate test improprieties. (Jacobson, 2006). While the pressure on schools and teachers to have their student perform well is large these practices are clearly unethical and have lead to school personnel being fired from their jobs (Cizek, 2003).

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Index

B

Bloom's Taxonomy

[Lesson 4.2: Formulating Learning Objectives](#)

C

convergent thinking

[Lesson 8.2: Critical Thinking and Creative Thinking](#)

critical thinking

[Lesson 8.2: Critical Thinking and Creative Thinking](#)

D

divergent thinking

[Lesson 8.2: Critical Thinking and Creative Thinking](#)

L

learning objectives

[Lesson 4.2: Formulating Learning Objectives](#)

P

problem solving

[Lesson 8.3: Problem-Solving](#)

S

Stanines

[Lesson 11.3: Understanding Test Results](#)

Glossary

Sample Word 1 | Sample Definition 1

Glossary

Sample Word 1 | Sample Definition 1

Glossary

Sample Word 1 | Sample Definition 1

Detailed Licensing

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- [Assessment of Students](#) - *Undeclared*
 - [Front Matter](#) - *Undeclared*
 - [TitlePage](#) - *Undeclared*
 - [InfoPage](#) - *Undeclared*
 - [Table of Contents](#) - *Undeclared*
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 - [Lesson 5.2: Involving all](#) - *Undeclared*
 - [Lesson 5.3: Talk for Learning and Pair Work](#) - *Undeclared*
 - [Lesson 5.4: Using Questions](#) - *Undeclared*
 - [Lesson 5.5: Monitoring and Giving Feedback](#) - *Undeclared*
 - [Lesson 5.6: Using Group Work](#) - *Undeclared*
 - [Lesson 5.7: Storytelling, Songs, and More](#) - *Undeclared*
 - [Lesson 5.8: Assessing Progress and Performance](#) - *Undeclared*
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 - [Lesson 8.3: Problem-Solving](#) - *CC BY 4.0*
 - [Lesson 8.4: Broad Instructional Strategies that Stimulate Complex Thinking](#) - *CC BY 4.0*
 - [Lesson 8.5: Questioning](#) - *CC BY-NC-SA 4.0*
 - [9: Creating Assessment Questions](#) - *CC BY 4.0*
 - [Lesson 9.1: Basic Concepts](#) - *CC BY 4.0*
 - [Lesson 9.2: Absence of Bias](#) - *CC BY 4.0*
 - [Lesson 9.3: Selected Response Questions](#) - *CC BY 4.0*
 - [Lesson 9.4: Constructed Response Items](#) - *CC BY 4.0*
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 - Lesson 10.3: Ethical or Unethical Practices in Testing - *Undeclared*
 - Lesson 10.4: References - *CC BY 4.0*
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 - Lesson 11.1: Basic Concepts - *CC BY 4.0*
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 - Lesson 11.3: Understanding Test Results - *CC BY 4.0*
 - Lesson 11.4: Issues with Standardized Tests - *CC BY 4.0*
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 - Index - *Undeclared*
 - Glossary - *Undeclared*
 - Glossary - *Undeclared*
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