



This course examines the principles of assessment in the context of the National Science Education Standards. Through completion of the content and activities in this course, teachers develop the competencies that enable them to improve the assessment and interpretation of science literacy in their classrooms.

About the Instructor

Juliana Texley has taught biology, Earth, and environmental sciences for over 30 years and has a Ph.D. in science education. She has taught kindergarten through graduate school, and even worked for seven years as Superintendent of a growing school district. Currently she teaches college level science, technology courses to graduate students and develops web curricula for both students and teachers.

Course Delivery

Critical to the professional-development experience of teachers today is learning to function effectively in an online learning environment, one that is destined to expand in the future. Assessment of Student Literacy is an online course completed in five weeks, with an additional one-week grace period for submitting assignments. Although students may work on assignments offline, all course content, links to supplementary information, interaction among students in the class, class discussions, quizzes, submission of assignments, and interaction with the instructor are carried out online, through email and the course site. This online format is designed for educators who need access to professional development on a flexible schedule and who are in different locations worldwide. However, these teachers are generally highly motivated and bring seasoned perspectives to discussions and to their own projects. Students earning college credit are required to participate in advanced discussions and complete the assignments outlined in this document.

Recommended Reading

Colburn, Alan *The Lingo of Learning*. Arlington, VA: National Science Teachers Association, 2003.

Lowery, Lawrence. *Pathways to the Science Standards (Elementary)*. Arlington, VA: National Science Teachers Association, 1997.

National Resource Council, *National Science Education Standards*. January, 1996. <http://books.nap.edu/html/nses/html/index.htm>.

Rakow, Steve. *Pathways to the Science Standards (Middle Level)*. Arlington, VA: National Science Teachers Association, 1998.

Wild, Ann and Juliana Texley. *Pathways to the Science Standards (Secondary)*. Arlington, VA: National Science Teachers Association, 1996.

Sandra K. Enger and Robert E. Yager *Assessing Student Understanding in Science*. Thousand Oaks, CA: Corwin Press, 2000.

In addition, students should survey various websites that reflect diverse opinions on testing using sources such as <http://www.getsmarter.org>, the national position statement on voluntary national tests at www.ed.gov/nationaltests/, and a national movement against standardized testing at <http://nomoretests.org>.

Performance Objectives

In this course, students will:

1. Develop deep content knowledge of the principals of good assessment.
2. Develop an understanding of reliability, validity, and the components of test variance.
3. Develop an understanding of the definition and characteristics of science literacy.
4. Learn to evaluate test items for reliability and validity.
5. Learn to analyze the factors which contribute to test variance.
6. Learn to implement performance testing of science skills.
7. Learn to understand the basis for public/social attitudes toward assessment.
8. Learn to apply the knowledge of better assessments to societal issues.
9. Learn to develop better objective test items.
10. Learn to rely on better sources of information for most assessment information.
11. Learn to use action research to develop a deeper understanding of student test performance.





C O U R S E O U T L I N E

WEEK 1 • *What Is the Role of Assessment?*

Participants

will look at the qualities of good assessments in science education. They will examine factors that affect reliability and validity, and evaluate assessments of knowledge, skills, and attitudes. They will compare criterion- and norm-referenced tests.

MAJOR IDEAS

Assessment is vital to educational planning and to learning. But to be effective, it must be conducted in a knowledgeable and careful manner.

Topics Include:

- A. Why Do We Assess Students?
- B. What Do We Want to Assess?
- C. Who Wants to Know? Who Are the Consumers of Assessment Data?
- D. Choosing the Right Assessment.
- E. The Many Uses of Assessment Data.
- F. Alignment of Assessment Data for Student Success.

Assignments

1. Introduce your self to the community of learners via a student home page and contribution to specific areas of scholarly discussion.
2. Conduct a random survey of citizens regarding perceptions of the reliability, validity and value of state assessments. Report on the survey on the discussion board.
3. Compare a variety of positions on public attitudes toward testing using sources such as <http://www.getsmarter.org>, the national position statement on voluntary national tests at www.ed.gov/nationaltests/, and a national movement against standardized testing at <http://nomorettests.org>.





C O U R S E O U T L I N E

WEEK 2 • *Selecting Assessment Strategies*

Participants will begin to enhance their ability to build assessments. They will examine examples of many forms of assessment and evaluate the value of each. They will also begin to explore the purpose and value of authentic assessment.

Topics include:

- A. Tools for Building Assessments.
- B. How to Assess the Standards We Value.
- C. Performance Assessments.
- D. Assessments of Content Knowledge.
- E. Integrating Assessment Styles.
- F. A Formula for Good Assessment.

MAJOR IDEAS

Assessments must be carefully matched with our goals and expected outcomes. Selecting the format of an assessment is the first step toward success.

Assignments

1. Examine the validity of a given objective test by comparing the performance of a group of students on that test and their performance on an interview-style assessment of logical reasoning. (This may be the first component of the action research in week 5.)
2. Demonstrate understanding of the basic correlation statistic as the results of the action research in #1 are analyzed.



C O U R S E O U T L I N E

WEEK 3 • *Effective Science Content Assessments*

Participants will examine the factors that increase the validity and reliability of classroom tests.

Topics include:

- A. **Begin at the End: Aligning Assessments with Standards.**
- B. **Multiple-Choice Test Construction.**
- C. **True-False Test Construction.**
- D. **Matching Test Construction.**
- E. **Labeling Test Construction.**
- F. **Fill-In Test Construction.**
- G. **Short-Answer and Essay-Test Construction.**
- H. **Using Concept Maps.**

MAJOR IDEAS

They will explore multiple-choice/true-false/fill-in and various other test formats, working toward the goal of developing better classroom tests. Finally, they will develop rubrics and concept maps to increase the validity of their assessments.

Assignments

1. Using scholarly sources and text from the course, analyze the reliability of a selected objective test that you or a colleague have developed.
2. Research the use of consistent techniques for construction of objective tests among a number of standardized tests that are available on our course platform. Report on the results of your analyses





C O U R S E O U T L I N E

WEEK 4 • *Putting It All together: Assessing Science Literacy*

Participants explore performance assessments as methods of measuring growth in science literacy.

Topics include:

- A. Assessing Science Literacy in the Age of the National Science Education Standards.
- B. Using Performance Tasks for Assessment.
- C. Assessing Attitudes.
- D. Defining Science Literacy Skills.
- E. How to Use Scaffolding.
- F. Types of Guides and Rubrics.
- G. Developing Rubrics.

MAJOR IDEAS

Students expand their ability to assess skills and attitudes through diverse assessment methods. Tools include scaffolding, holistic scoring, and rubrics.

Assignments

1. Do a literature search investigating forms of performance assessments which might be used in your grade and subject.
2. Develop a short performance assessment relevant to your grade and subject, and administer it to volunteer students. (This may become the basis for your action research in Week 5.)
3. Report on the results of your performance assessment and contribute to class discussions.
4. Review the position of the National Science Education Standards on performance assessments in <http://books.nap.edu/html/nse/html/index.htm>.



C O U R S E O U T L I N E

WEEK 5 • *A Fair Test for All Students*

Participants

review the principles of equity in assessment, and explore the implications of multiple intelligence theory in assessment in the light of the National Science Education Standards.

Topics Include:

- A. What Is Equity in Assessment?
- B. Learning Styles and Assessment.
- C. Multiple Intelligences.
- D. Additional Intelligences.
- E. Designing an MI Assessment.
- F. Rubrics for an MI Assessment.

MAJOR IDEAS

Students compare the validity of various forms of assessment in the light of the National Science Education Standards, and expand their work in week 2 or 4 by relating their results to research literature.

Assignments

1. Using scholarly sources, analyze the results of the action research you did in week 2 or week 4.
4. That should include the development of an (anonymous) database, use of appropriate statistical techniques, and development of appropriate conclusions. Your summary should take the form of a paper which integrates the course content, your outside reading and your action research.



GRADING PROCEDURES

The final grade for this course is based on

- completion of the course assignments (50%),
- substantive participation in weekly discussions (25%),
- and performance on assessments (25%).

Student participation and demonstrated knowledge are evaluated weekly. Postings on the discussion boards should be guided by the following rubric:

- **Level 4:** High-quality professional discourse that invites inquiry. The message creates an inviting framework by sharing a personal reflection; presenting an interesting and well-articulated dilemma, challenge, or issue; or raising a thought-provoking question
- **Level 3:** Thoughtful professional discourse. The message shares information, an issue, or a question in a thoughtful way, which might focus on specific details, explore the "why's" as well as the "what's," or explore others' beliefs and practices.
- **Level 2:** Collegial discussion and/or "shop talk." Message could be a response to a previous message; a request; a description of classroom practice; or an issue, dilemma, or challenge that reflects the beliefs or practice of the author but lacks self-reflection and/or an invitation to others to respond.
- **Level 1:** Factual statements or informational. Message is usually a question, a brief statement of fact or opinion, or an announcement that does not tend to stimulate ongoing professional discussion, thoughtful reflection, or examination of beliefs and/or practice.

Accumulated points of 100 possible points during the course determine CEU credit and letter grades for ONE graduate unit as follows:

- 90–100 = grade of A
- 80–89 = grade of B
- 70–79 = grade of C
- 70–100 = credit for 5 CEU's

Students earning graduate credit will complete an academic assignment in consultation with the instructor consisting of a research paper or action research paper in a scholarly format, supported by appropriate references. Students earning a second graduate credit will complete an additional project, also in consultation with the course instructor. An additional maximum of 100 points may be earned for the second project.