GEORGIA DEPARTMENT OF EDUCATION

Kathy Cox, State Superintendent of Schools

Training for the New Georgia Performance Standards
Day 1: Standards-Based Education and the GPS

Participant's Guide
Science Grades 3-5

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Carolyn Baldree
Eloise Barron
Gerald Boyd
Kathleen Boyle
Lisa Copeland
William Cranshaw
Robin Gower
Sally Krisel
Marty Lawrence
Phyllis Martin
Alicia McCartney
Sallie Mills
John O'Connor
Stephen Pruitt
Sherry Reynolds
Cynde Snider
Sharrita Stanley
Marlee Tierce

For more information on this or other GPS training modules, please contact Gerald Boyd at (404) 656-0476 or gboyd@doe.k12.ga.us.

Use of This Guide

The module materials, including a Content Facilitator's Guide, Participant's Guide, PowerPoint Presentation, and supplementary materials, are available to designated trainers throughout the state of Georgia who have successfully completed a Train-the-Trainer course offered through the Georgia Department of Education.

Materials (guides, presentations, etc.) will be available electronically on http://www.georgiastandards.org under the training tab after all trainings of Day 1 have occurred. Consult the trainer for other availability.

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Agenda

This is a one-day course, with approximately seven hours of instructional time.

Introduction...30 minutes

Overview of Standards .... 2 hours, 30 minutes

Standards-Based Teaching and Learning ....1 hour, 50 minutes

Unpacking Content Standards..1 hour, 40 minutes

Summary and Follow up Assignments .... 30 minutes

Module Goal

Demonstrate a deep understanding of the new Georgia Performance Standards and the standards-based education approach, through thoughtful curriculum planning, development of formative and summative assessments, and the design of instruction matched to the standards and research-based best practices. This shall be measured by student performance on progress monitoring and standardized criterion-referenced tests.

Key words from the goal:

- Deep understanding
- Georgia Performance Standards (GPS)
- Standards-based education
- Research-based best practices

Note that the goal will not be reached by day one of training alone. It will take preparation, follow up, and seven days of classroom instruction to master this goal. Various days of training will deal with different components of the goal, such as curriculum planning, assessment, and instruction.

Module Objectives

By the end of day one of training, participants will be able to:

1. Describe the benefits of the GPS.

2. Describe the various phases of the GPS rollout plan.

3. Define terms related to the GPS.

4. Identify four parts of each standard.

5. Describe the backward design process used in standards-based teaching and learning.

6. Identify key components of the applicable standards (for example, 5th grade science).

Provided Texts

Each school will receive a copy of each book listed below at the beginning of this school year.

American Association for the Advancement of Science. *Benchmarks for Science Literacy.* New York, New York: Oxford University Press. 1993.

National Research Council. *National Science Education Standards.* Washington, D.C.: National Academy Press. 1996.

Each school received one copy of each book listed below at the beginning of the previous school year. This box of books was addressed to the principal of the school.

Hayes Jacobs, Heidi. *Mapping the Big Pictures: Integrating Curriculum and Assessment K-12.* Alexandria, VA: Association for Supervision and Curriculum Development. 1997.

Marzano, Robert J. *What Works in Schools: Translating Research into Action.* Alexandria, VA: Association for Supervision and Curriculum Development. 2003.

Robert J. Marzano, Debra Pickering, and Jay McTighe. *Assessing Student Outcomes: Performance Assessment Using the Dimensions of Learning Model.* Alexandria, VA: Association for Supervision and Curriculum Development. 1993.

Marzano, Robert J, Debra J. Pickering, and Jane E. Pollock. *Classroom Instruction That Works: Research-Based Strategies for Increasing Student Achievement.* Alexandria, VA: Association for Supervision and Curriculum Development. 2001.

Marzano, Robert J, Jana Marzano, & Debra Pickering. *Classroom Management That Works: Research-Based Strategies for Every Teacher.* Alexandria, VA: Association for Supervision and Curriculum Development. 2003.

Strong, Richard W., Harvey F. Silver, and Matthew J. Perini. *Teaching What Matters Most: Standards and Strategies for Raising Student Achievement.* Alexandria, VA: Association for Supervision and Curriculum Development. 2001.

Tomlinson, Carol Ann. *How to Differentiate Instruction in Mixed-Ability Classrooms, 2nd edition.* Alexandria, VA: Association for Supervision and Curriculum Development. 2001.

Wiggins, Grant and Jay McTighe. *Understanding by Design.* Alexandria, VA: Association for Supervision and Curriculum Development. 1998.

Wiggins, Grant and Jay McTighe. *Understanding by Design Study Guide.* Alexandria, VA: Association for Supervision and Curriculum Development. 2000.

Professional Organizations

National Science Teachers Association—NSTA—http://www.nsta.org
Georgia Science Teachers Association—GSTA—http://www.georgiascienceteacher.org
National Council of Teachers of Mathematics—NCTM—http://www.nctm.org
Georgia Council of Teachers of Mathematics—GCTM—http://www.gctm.org

Web Sites

Units (incorporating Learning Focused components). Connected Learning. http://www.title3.org/.

BOCES is a cooperative service organization that helps school districts save money by pooling resources and sharing costs.

Special Education Resources

Access, Participation, & Progress in the General K-12 Curriculum. National Center on Accessing the General Curriculum (ncaog.org).

Approximately 70 general and special educators and parents attended the National Capacity Building Institute on Access, Participation, and Progress in the General Curriculum, held on July 10, in Arlington, VA. The article includes the proceedings from the Institute.

Aligning Special Education with NCLB. www.ldonline.org.

The No Child Left Behind Act (NCLB) is a standards-based reform movement. This movement emphasizes standards and the alignment of curriculum and assessment to those standards. States established what is to be taught. The goal of standards is to increase academic achievement levels. A related goal is to close the achievement gap for students who have traditionally been at-risk for academic failure or lack of success. This group includes students with disabilities.

Thompson, S., Thurlow, M., Quenemoen, R.F., & Esler, A. (2001). *Addressing Standards And Assessments On State IEP Forms*, National Center on Educational Outcomes (NCEO Synthesis Report 38)

This article summarizes data on each State's use of standards in developing Individualized Education Programs (IEP) for students with disabilities. All fifty states were asked to send their IEP forms and to indicate whether the forms were required, recommended, or simply sample forms. Out of the 41 states with IEP forms, only 5 states specifically addressed the general curriculum on their forms. Recommendations for IEP forms that provide decision-making guidance involving access to the general curriculum are summarized.

Writing Standards-based IEPs. Colorado Department of Education. www.cde.org.

The Colorado Department of Education provides information for teachers on developing standards-driven IEPs. The summary includes a definition of standards-driven IEPs, characteristics of standards-driven IEPs, and a rationale for standards-driven IEPs.

Resources for Differentiation

Association for Supervision and Curriculum Development. *At work in the differentiated classroom.* Alexandria, VA. Author. (video staff development set). 2001.

Chapman C. & Gregory, G. *Differentiated instruction strategies for writing in the content areas.* Thousand Oaks, CA: Corwin Press. 2003.

Coil, C. *Standards-based activities and assessments for the differentiated classroom*. Marion, IL: Pieces of Learning. 2004.

Tomlinson, C. *Fulfilling the promise of the differentiated classroom: Strategies and tools for responsive teaching*. Alexandria, VA: Association for Supervision and Curriculum Development. 2003.

Winebrenner, S. *Teaching gifted kids in the regular classroom*. Minneapolis, MN: Free Spirit. 1992.

Card Template

Read the book Everybody Needs a Rock.	Make a graph of morning temperature readings.	Sketch landforms of Georgia on a map
Use a dictionary to look up the term *invertebrate.*	Use a ruler to measure the height of a plant.	Research planets on the Internet.
Make a scale of distances between planets.	Write poems about the sky.	Produce a skit about the history of electricity.
Paint a model of a volcano.	Give an oral report.	Tally the number of simple machines in the classroom.
Email a friend to compare weather conditions.	Use a balance scale to measure rocks.	View a video on snakes.
Make a fossil using clay and a sea shell.	Throw various size and weight balls and measure distances.	Make a musical instrument with 3 different pitches.
Map the hottest and coldest area of the classroom.	Draw a picture of an animal in its home.	Interview a cafeteria worker about food preservation and maintenance.
Compare the measurement of an ice cube and the amount of water after it melts.	Calculate the fraction of number of days it rained in one month.	Measure the length of a rock.
Measure a grid on the playground to map organisms there.	Give the place value of the digits in the distances from planets to the sun.	Write a letter to a friend about the importance of microorganisms.
Solve an equation to explain that the total weight of an object is equal to the sum of its parts.		

What We Know/What We Want To Know

What I Know	What I found out
What I Want to Know	**What I found out**

Phase-In Plan

Phase-in Plan

Grade	Year I ELA	Year II ELA	Year I Math	Year II Math	Year I Science	Year II Science	Year I Soc. Studies	Year II Soc. Studies
K	04-05	05-06	05-06	06-07	06-07	07-08	07-08	08-09
1	04-05	05-06	05-06	06-07	06-07	07-08	07-08	08-09
2	04-05	05-06	05-06	06-07	06-07	07-08	07-08	08-09
3	04-05	05-06	06-07	07-08	**05-06**	**06-07**	07-08	08-09
4	04-05	05-06	06-07	07-08	**05-06**	**06-07**	07-08	08-09
5	04-05	05-06	06-07	07-08	**05-06**	**06-07**	07-08	08-09
6	04-05	05-06	04-05	05-06	04-05	05-06	06-07	07-08
7	04-05	05-06	05-06	06-07	04-05	05-06	07-08	08-09
8	04-05	05-06	06-07	07-08	06-07	07-08	06-07	07-08
9	04-05	05-06	07-08	08-09	04-05	05-06	06-07	07-08
10	04-05	05-06	07-08	08-09	04-05	05-06	06-07	07-08
11	04-05	05-06	07-08	08-09	04-05	05-06	06-07	07-08
12	04-05	05-06	07-08	08-09	04-05	05-06	06-07	07-08

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Science at a Glance

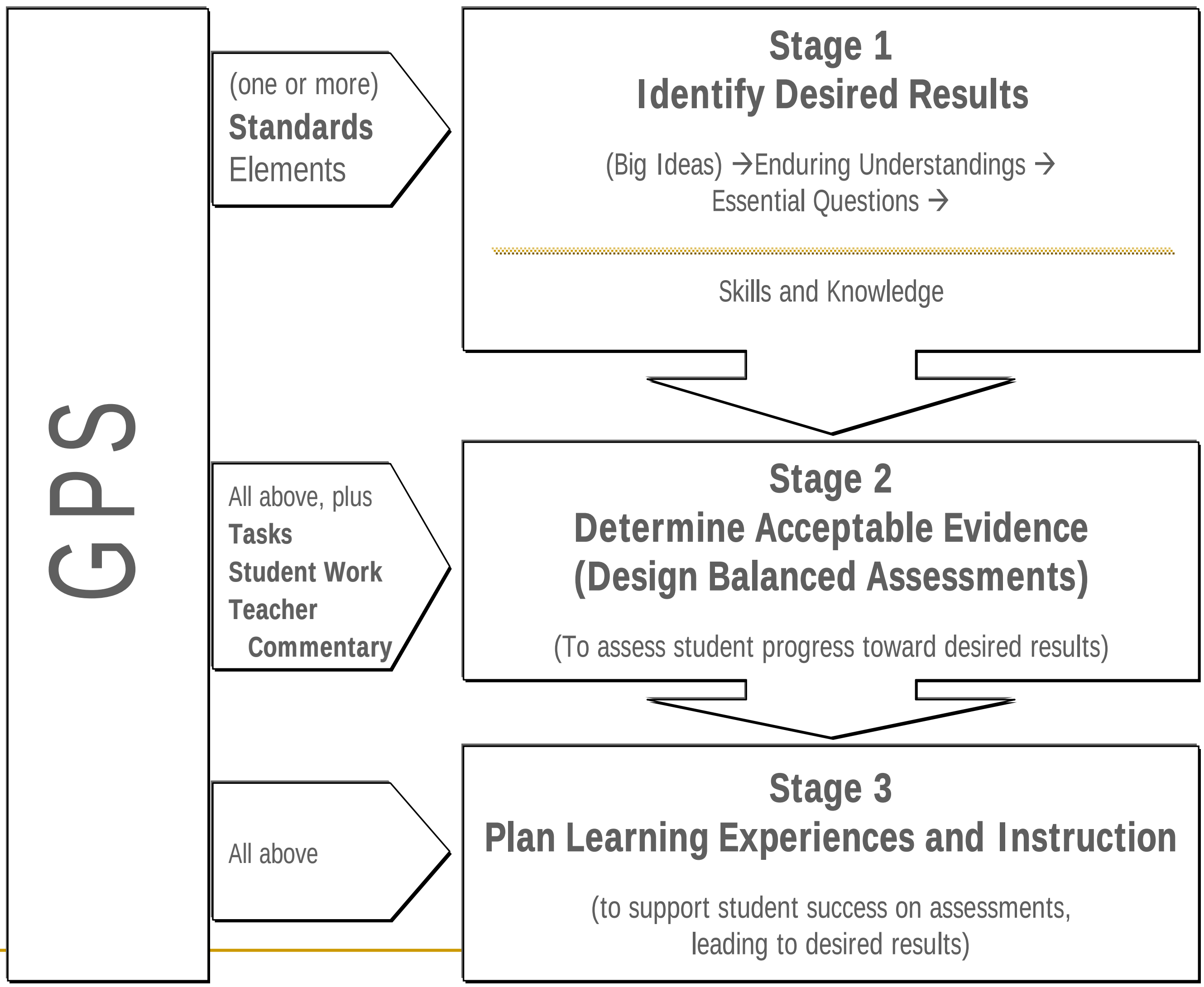
	Earth Science	Physical Science	Life Science
Kindergarten	Day and Night Sky	Physical Attributes (5 senses)	Living and Nonliving
(My World and Me)	Sorts Rocks and Soils	Composition of Material	Parents and Offspring
		Motion	
First Grade	Weather Patterns	Sound	Characteristics of Living Things
(Patterns)	Seasons	Shadows (Light)	Basic needs of Living Things
		Magnets	
Second Grade	Motion/Patterns of celestial bodies	Changing attributes of materials	Life Cycles
(Change)	Changes in the earth's surface	States of Matter	
		Energy keeps things going	
		Pushes and Pulls	
Third Grade	Rocks and Minerals of Ga	Heat Energy	Habitats
(Form and Function)	Soils	Magnets	Features of Organisms of Ga
	Fossils		Pollution and Conservation
	Weathering		
Fourth Grade	Stars and Star Patterns	Light	Ecosystems
(Models)	Solar System	Sound	Food Chain/Web
	Weather data and forecasting	Force, Mass, Motion & Simple Machines	Adaptation-Survival/Extinction
		Effects of Gravity	
Fifth Grade	Landforms in Georgia	Intro to Cons. Of Matter	Classification of Organisms
(Evidence)	Constructive/Destructive forces	Physical/Chemical Changes	Inherited Traits and Learned Behaviors
	Role of Technology in control	Electricity and Magnetism	Cells and microorganisms

Scaffolding Choose one topic

Topic	K-2	3-5	6-8	9-12
Classification				
Energy				
Matter				
Other				

GPS and the Backward Design Process

Standards Based Education Model



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Unpacking a Standard or Multiple Standards

Standard (underline big ideas, add as needed) (Include Characteristics of Science and Content Standards.)	
Element(s)	
Enduring understandings	
Essential questions	
Skills and knowledge	

A Big Idea…

…Provides a "conceptual lens" for organizing content. A Big Idea refers to core concepts, principles, theories, and processes that should serve as the focal point of the curricula, instruction, and assessment. Big Ideas reflect expert understanding and anchor the discourse, inquiries, discoveries, and arguments in a field of study. They provide a basis for setting curriculum priorities to focus on the most meaningful content.

…Serves as an organizer for connecting important facts, skills, and actions. Big Ideas function as the "conceptual Velcro" for a topic of study. They connect discrete knowledge and skills to a larger intellectual frame and provide a bridge for linking specific facts and skills. A focus on these larger ideas helps students to see the purpose and relevance on content.

…Transfers to other contexts. Discrete facts do not transfer. Big Ideas are powerful because they embody transferable ideas, applicable to other topics, inquiries, context, issues, and problems. Because we can never cover all the knowledge on a given topic, a focus on the Big Ideas helps to manage information overload. Big Ideas provide the conceptual through lines that anchor a coherent curriculum.

…Manifests itself in various ways within disciplines. Big Ideas are typically revealed through one or more of the following forums: a core concept (e.g., adaptation), a focusing theme (e.g., man's inhumanity to man), an ongoing issue or debate (e.g., liberal vs. conservative), a puzzling paradox (e.g., poverty amidst plenty), an important process (e.g., writing process), an authentic problem or persistent challenge (e.g., illiteracy, voter apathy), an illuminating theory (e.g., Manifest Destiny), an underlying assumption (e.g., the markets are rationale), or differing perspectives (e.g., terrorist vs. freedom fighter).

…Requires uncoverage because it is an abstraction. A Big Idea is inherently abstract. Its meaning is not always obvious to students, and simply covering it (i.e., the teacher or textbook defining it) will not ensure student understanding. "Coverage" is unlikely to cause genuine insight; understanding must be earned. Thus, the idea must be uncovered—its meaning discovered, constructed or inferred by the learners, with the aid of the teacher and well-designed learning experiences.

How to identify big ideas: Read the standard thoroughly. Underline the big ideas in the standard. Make additional notes as needed. Note that this is just a stepping stone in the process; once you have turned your Big Ideas into enduring understandings, you do not need to write them down.

Reproduced with permission from Wiggins, Grant and Jay McTighe. *Understanding by Design Professional Development Workbook*. Alexandria, VA: Association for Supervision and Curriculum Development. 2004.

An Enduring Understanding…

…Involves the big ideas that give meaning and importance to facts. Enduring understandings are made up of the concepts, principles, and theories that weave many facts into revealing and useful patterns. They involve the (few) organizing priority ideas that enable us to make sense of past lessons, conduct current inquiry, and create new knowledge.

…Can transfer to other topics, fields, and adult life. Such understandings endure in that they enable us to make vital and informative connections in our learning—as students and as adults. For example, the idea that "might does not make right" applies to both playground disputes and international diplomacy.

…Is usually not obvious, often counter-intuitive, and easily misunderstood. An understanding is an inference, not a fact. It is an insight derived from inquiry. Key understandings in intellectual fields (e.g., in physics: *Objects remain in motion at a constant velocity if no force acts on them*) often violate common sense and conventional wisdom. They are thus often prone to misunderstanding by students. These understandings therefore cannot be covered; they must be uncovered.

…May provide a conceptual foundation for basic skills. The skill-based teaching in mathematics, foreign language, and physical education does not seem to deal with "understanding." In most units, all skills derive their value from the strategic principles that help us know when and how to use the skill. The understandings also justify the use of skills (e.g., the student who can explain why you should use a bent-arm pull in swimming free style) and enable the student to extend the use of the skill to new situations (e.g., the use of bent-arm pull in back stroke).

…Is deliberately framed as a generalization—the "moral of the story." An understanding is a generalization derived from inquiry. It is the specific insight that should be inferred from study of the topic (not just the stating of the topic)—what we want the student leaving the study to realize. Note: The enduring understanding of a unit might be that there is no single agreed-upon understanding, or that people disagree about how the issues, facts, or text should be understood.

How to identify enduring understandings: Frame them as full-sentence generalizations starting with "The student will understand that…" Avoid statements that are vague or trite. It may help to think about common <u>mis</u>understandings about the topic. Enduring understandings may be overarching (beyond the specifics of the unit) or topical.

Essential Questions…

…Have no simple "right" answer; they are meant to be argued. Essential questions yield inquiry and argument—a variety of plausible responses, not straightforward facts that end the matter. They should *uncover* rather than cover the subject's puzzles and perspectives. They should result in conclusions drawn by the learner, not recited facts. Like enduring understandings, they may be topical or overarching.

Examples: Does art reflect culture or help shape it? What makes a great story?

…Are designed to provoke and sustain student inquiry, while focusing learning and final performances. Essential questions work best when they are designed and edited to be thought provoking to students, engaging them in sustained, focused inquiries that culminate in important performance. They involve the counterintuitive, the visceral, the whimsical, and the controversial.

Examples: Does food that is good for you have to taste bad? Are censorship and democracy compatible?

…Often address the conceptual or philosophical foundations of a discipline. They reflect the most historically important issues, problems, and debates in a field of study.

Examples: What is a proof? Nature or nurture? Can fiction reveal truth?

…Raise other important questions. Essential questions lead to other important questions within, and sometimes across, subject boundaries.

Example: In nature, do only the strong survive? (Leads to questions such as, "What is strength? Are insects strong, since they are survivors?)

…Naturally and appropriately recur. The same important questions are asked and asked again throughout one's learning.

Example: What makes a book "great?"

…Stimulate vital, ongoing rethinking of big ideas, assumptions, and prior lessons. They force us to ask deep questions about the nature, origin, and extent of our understanding.

Example: (In light of fractions, place value, irrationals, and negative square roots) what is a number?

How to develop essential questions: Two to five per unit is reasonable. Put them in language appropriate to students. Use them as organizers for the unit, making the "content" answer the questions. Sequence questions so they lead naturally from one to another. Share essential questions with other teachers to ensure curricular coherence.

Skills and Knowledge

Knowledge. Getting students to construct meaning, organize information, and (selectively) store information. This includes

- Vocabulary
- Terminology
- Definitions
- Key factual information
- Formulas
- Critical details
- Important events, people
- Sequence and timelines
- Rules
- Laws
- Principles
- Concepts

Skills. Getting students to demonstrate the ability to do something. These may be very simple, discrete operations, or more complex creative ones. This includes

- Actions, procedures, and processes
- Basic skills—decoding, arithmetic computation
- Psychomotor skills—running, swimming a back stroke, playing an instrument
- Study skills
- Communication skills—listening, speaking, writing
- Thinking skills—comparing, inferring, analyzing, interpreting
- Research, inquiry, investigation skills
- Interpersonal/group skills

Verbs to use when stating skills and knowledge. These are samples only:

- Demonstrate
- Derive
- State
- Describe
- List
- Design
- Express
- Induce
- Instruct
- Create
- Critique
- Compare/contrast
- Evaluate
- Illustrate
- Judge
- Make meaning of
- Make sense of
- Use
- Model
- Predict
- Prove
- Show
- Synthesize
- Justify
- Choose
- Imagine
- Assess
- Write
- Draw
- Translate
- Adapt
- Build
- Determine
- Perform
- Solve
- Test

How to develop skills and knowledge statements: Look at the enduring understandings, essential questions, and elements. Ask yourself, "What skills and knowledge do students need in order to reach this goal?" Start each skill/knowledge statement with a verb.

Unpacking a Standard or Multiple Standards

Standard (underline big ideas, add as needed) (Include Characteristics of Science and Content Standards.)	
Element(s)	
Enduring understandings	
Essential questions	
Skills and knowledge	

Follow Up Assignment

- **Directions: Redeliver Day 1: How to Unpack a Standard**
- **Use the standard you unpacked or choose a different one to unpack.**
- **Make a list of ways to assess a student's understandings of those big ideas, understandings and essential questions.**
- **What evidence is necessary? How good is good enough?**

Action Plan

Directions: Complete the following chart to help shape your team's work before day two of training. You should analyze at least one standard in each strand, including big ideas, understandings, essential questions, skills and knowledge, and evidence. Here are some questions to consider:

- What do we need?
- What do we have?
- How can we obtain needed information or resources?
- What can we develop as a team?
- What is our plan for completing the work and learning together?

GPS Standards we will tackle:				
Step/Activity	**Who**	**By When**	**How**	**Resources and Ideas**

Glossary

CONTENT STANDARDS:	Content standards state the purpose and direction the content is to take, and are generally followed by elements. Content standards define what students are expected to know, understand, and be able to do.
CURRICULUM DOCUMENT:	The Georgia Performance Standards document is the curriculum document that contains all standards that should be learned by all students.
ELEMENTS:	Elements are part of the content standards that identify specific learning goals associated with the standard.
PERFORMANCE STANDARDS:	Performance standards define specific expectations of what students should know and be able to do and how well students must perform to achieve or exceed the standard. Georgia's performance standards are composed of four components: content standards, tasks, student work, and teacher commentary.
PROCESS STANDARDS:	Process standards define the means used to develop patterns of thought and behavior that lead to conceptual understanding.
STANDARD:	Something set up and established by authority as a rule for the measure of quantity, weight, extent, value, or quality.
STANDARDS-BASED EDUCATION:	In standards-based classrooms, standards are the starting point for classroom instruction that ensures high expectations for all students.
STRAND:	A strand is an organizing tool used to group standards by content. For example, the English language arts curriculum contains strands of reading, writing, listening, speaking, and viewing. K-5 science curriculum contains a life science strand, physical science strand, and an earth science strand.
STUDENT WORK:	Examples of successful student work are included to specify what it takes to meet the standard and to enable both teachers and students to see what meeting the standard "looks like."

TASKS: Keyed to the relevant standards, tasks provide a sample performance that demonstrates to teachers what students should know and be able to do during or by the end of the course. Some tasks can serve as activities that will help students achieve the learning goals of the standard, while others can be used to assess student learning; many serve both purposes. Although the Georgia Performance Standards include tasks, teachers may develop their own tasks.

TEACHER COMMENTARY: Teacher commentary is meant to open the pathways of communication between students and the classroom teacher as well as within faculty in order to ensure consistency within assessment and expectations. Commentary shows students why they did or did not meet a standard and enables them to take ownership of their own learning.

Elementary Science Position Statement

NSTA Position Statement

Elementary School Science

The National Science Teachers Association supports the notion that inquiry science must be a basic in the daily curriculum of every elementary school student at every grade level. In the last decade, numerous reports have been published calling for reform in education. Each report has highlighted the importance of early experiences in science so that students develop problem-solving skills that empower them to participate in an increasingly scientific and technological world.

- The elementary science program must provide opportunities for students to develop understandings and skills necessary to function productively as problem-solvers in a scientific and technological world.
- Elementary school students learn science best when -
  a. they are involved in first-hand exploration and investigation and inquiry/process skills are nurtured.
  b. instruction builds directly on the student's conceptual framework.
  c. content is organized on the basis of broad conceptual themes common to all science disciplines.
  d. mathematics and communication skills are an integral part of science instruction.
- The learning environment for elementary science must foster positive attitudes towards self and society, as well as science.
- Elementary school students value science best when -
  a. a variety of presentation modes are used to accommodate different learning styles, and students are given opportunities to interact and share ideas with their peers.
  b. the scientific contributions of individuals from all ethnic origins are recognized and valued.

c. other subject areas are infused into science.

d. inquiry skills and positive attitudes are modeled by the teacher and others involved in the education process.

- Teacher preparation and professional development must enable the teacher to implement science as a basic component of the elementary school curriculum.
- Teacher preparation and professional development must provide for -

a. experiences that will enable teachers to use hands-on activities to promote skill development, selecting content and methods appropriate for their students, and for design of classroom environments that promote positive attitudes toward science and technology.

b. continuing science inservice programs based on current educational research that encompasses content, skills, techniques, and useful materials.

c. participation in workshops, conferences, and meetings sponsored by local, state, and national agencies.

- The school administrators must be advocates for elementary science.
- Administrators must provide instructional leadership by -

a. building consensus for an elementary science program that reflects state and national standards.

b. implementing and monitoring the progress of the science program.

- Administrators must provide support systems by -

a. supplying appropriate materials, equipment, and space.

b. recognizing exemplary elementary science teaching.

c. encouraging special science events.

- The instructional implementation and support system for elementary school science must include the combined efforts of all aspects of the community: parents, educators, businesses, and other organizations.
- The community must be advocates for elementary school science by -

a. participating in ongoing planning, assessment, and funding of elementary science programs.

b. promoting informal science learning experiences.

- Assessment must be an essential component of an elementary science program.
- Assessment must be aligned with -

a. what is of value, i.e., the problem-solving model of instruction: concept application, inquiry, and process skills.

b. the curricular objectives and instructional mode.

c. the purpose for which it was intended: grading, diagnosis, student and/or parent feedback, or program evaluation.

- Elementary school science instruction must reflect the application and implementation of educational research.
- Elementary school science programs are improved when -

a. teachers keep abreast of appropriate science education research.

b. educational research becomes the premise for change or innovation in elementary school science, and teachers participate in action research in elementary science.

--Adopted by the
Board of Directors
July 2002

This document can be found online at
www.nsta.org/positionstatement&psid=8

Learning Journal