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ABSTRACT

As part of Vermont's efforts to set shared educational goals, this document describes what is expected of Vermont students. It is designed as a guide to parents about what teachers and schools are doing to help students meet the state's new expectations. Vermont has defined an educational framework that encourages many different learning styles and circumstances. The Framework links skills and subjects with the conditions and practices that are known to be most likely to lead to student success. It is divided into "Vital Results" (skills) and "Fields of Knowledge" (specific subjects students should know). Some examples are given of the Framework for different subjects and grade levels. How the framework operates in an individual school is outlined, and suggestions are given for parent participation. (SLD)



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UNDERSTANDING

VERMONT'S ★

FRAMEWORK OF STANDARDS

★ AND ★

LEARNING OPPORTUNITIES

★

**The Vermont Institute for
Science, Math and Technology**

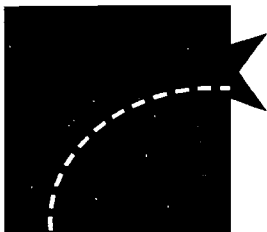
**1997
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VISMT

One in a series of booklets funded by The Josephine Bay Paul and C. Michael Paul Foundation



The Vermont Institute for Science, Math and Technology (VISMT) was established in 1992 as a nonprofit organization to implement a \$9.6-million National Science Foundation grant awarded to the Vermont Department of Education. The goal of the project is to dramatically transform science, math and technology education for all Vermont students.

This booklet was written and compiled by
Christine Graham
David Marsters
and the staff of the Vermont Institute of Science, Math & Technology

This booklet is one of a series funded through a grant from the Josephine Bay Paul and C. Michael Paul Foundation. VISMT and other education improvement organizations in Vermont are grateful to the Foundation for its thoughtful support of the programs that are improving the education of our children. Additional support provided by the Regional Alliance for Science Education



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Over the past six years Vermonters have worked together to set shared educational goals. This work has involved thousands of educators, business people, school board members and community members. From this process emerged a series of documents: *The Vermont Education Goals*, *The Green Mountain Challenge*, *The Common Core of Learning*, *The Vital Results*, and *The Fields of Knowledge*. These documents have built on one another, with each helping to bring into sharper focus the kind of education we want in our state.

These efforts have resulted in the establishment of standards for student performance and agreement on the best teaching practices for helping children learn. In January 1996, the state Board of Education adopted *Vermont's Framework of Standards and Learning Opportunities*. This document describes what we expect of Vermont students, and will serve as a guide to teachers and schools to help students meet those expectations.

Excellent education requires constant improvement with new approaches to learning. Vermont is making great progress in creating excellence in education, and the *Framework* is a tool that will continue that progress. It is important that parents and community members understand this new approach. The purpose of this booklet is to help you understand it better.

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Glossary of Terms

Alignment – a logical linking between curriculum and assessment, or between related parts of the curriculum.

Assessment – the careful and accurate measuring of student learning, and the clear communication of the results to teachers, parents and others.

Curriculum – plans created for what and how children learn.

Curriculum framework – the general guide local schools can use to develop their own specific curriculum.

Common Core – the basis of *Vermont's Framework*, which itself is the result of community forums.

Content – subject matter, specific knowledge concepts and skills of a subject

Equity – the assurance that each and every child has equal opportunity to learn.

Evidence – a clear indication that a student has met a specific standard.

Fields of Knowledge – groups of specific subjects containing specific things students should know.

Learning Opportunities – recommended ways of providing instruction and assessing students' progress in meeting standards.

Mathematics – the use of computation skills, logical thinking, prediction, patterns and problem-solving to explore, understand and describe the world.

Science – the use of observation, testing, explanation and prediction to describe natural phenomena.

Standards – guidelines for setting educational goals and deciding what essential concepts, content and skills that students should learn and gain through education.

Standards-based curriculum – course-work designed to assure a student's accomplishment of standards developed for the grade, school or district.

Technology – tools for learning, including information and equipment.

Vital Results – general skills that apply to many subjects and activities.





How the Framework Fits With Educational Goals

Change is one of the most common experiences we share today, in our communities, our workplaces and our schools. Change makes most of us uncomfortable, but we realize that our children will experience dramatic changes throughout their lifetimes and we can help them prepare for it. We know that we cannot prepare our children for the future simply by providing them with the knowledge we have today. We must give them skills to think, analyze, reason, collaborate, make judgments and become lifelong learners.

Many of the new approaches in Vermont schools are directed at giving our children knowledge and skills for lifelong learning and continual self-improvement. Schools are preparing students by ensuring that:

- high school graduates are literate in language, science, history, mathematics and technology
- graduates are prepared for rapid change in the workplace and society at large
- students are prepared to be active participants in democracy
- students have basic skills

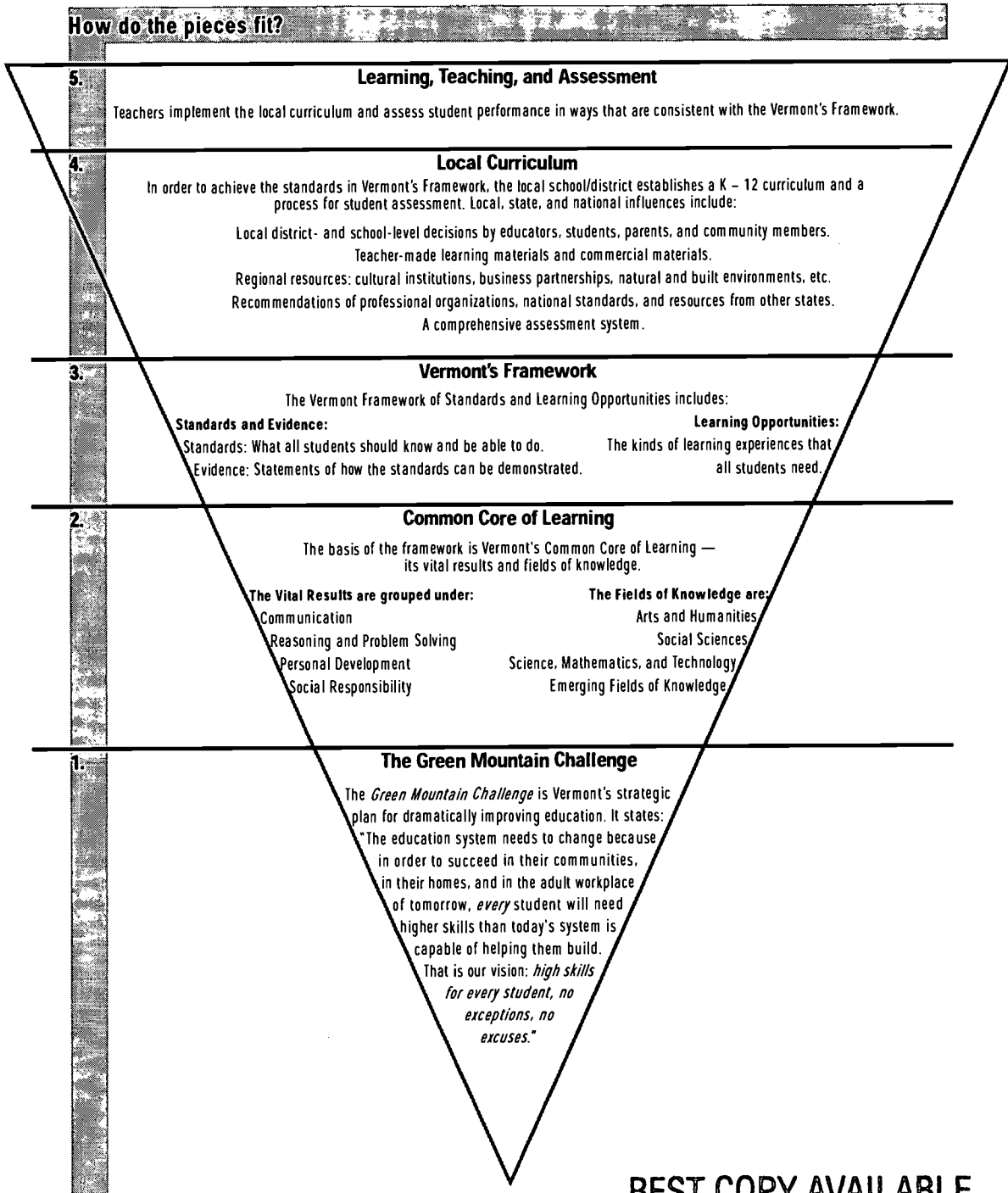
The *Framework* is one of the first documents to recognize the wide diversity of knowledge and skills our students need. It will help schools meet high-level goals with improvements in three areas:

- WHAT students learn
- HOW students learn and how to
- MEASURE student learning

The plans we create for “what” students learn are called curriculum, and plans for “how” students learn is called instruction. But plans alone don’t do the job. Measuring how much and how well our children learn is equally as important as what they learn. These measurements are called assessments. Assignments also allow for professionals to evaluate school programs to make decisions concerning curricula programs.

Setting educational goals and deciding what we will measure provides us with strong guidelines that strengthen learning. These guidelines are “Standards.” These standards are contained in *Vermont’s Framework of Standards and Learning Opportunities*.

The *Framework* describes the many ways that students learn best as “Learning Opportunities.” The document encourages many different learning styles and circumstances, because we know that all children can learn if they are supported in different, appropriate, ways. The *Framework* provides a road map that will help all students achieve high standards.



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While you will probably never have a reason to use the *Framework* document at home, you do need to know that every teacher and every school in Vermont has the opportunity to use it as a basic plan for education. The better you understand the *Framework* and its parts, the better you can support your child's learning and your community's growth. This booklet is designed to give you the understanding you need.

On page 4 you'll see an illustration of Vermont's education improvement efforts. Both statewide recommendations and local control are equally valued. Vermont's Framework is in the center, below it are the recommendations provided by the state as a base of improvement efforts, and above are the implementation stages that local schools and teachers provide.



Overview of Vermont's Framework of Standards

Communication

Reading
Strategies
Accuracy
Comprehension
Range of text

Writing
Dimensions
Conventions
Responses to literature
Reports
Narratives
Procedures
Persuasive writing
Personal essays

Listening
Clarification
Critique

Expression
Speaking
Artistic dimensions
Notation and representation

Information Technology
Research
Informational sources
Communication of data selection
Simulation and modeling

Reasoning and Problem Solving

Questioning
Comparing and contrasting
Making connections
Reflecting
Evaluating

Solving Problems
Process
Types
Effectiveness
Mathematics dimensions

Persistence
Application
Information
Taking risks
Persevering

Abstract & Creative Thinking
Fluency
Elaboration
Flexibility
Product/service
Plan/organize

Personal Development

Worth and Competence
Goal-setting
High-quality work
Learning strategies
Respect

Health
Development
Disease prevention
Personal health
Access to health resources
Nutrition
Fitness

Informed Decisions
Evidence vs. opinion
Personal economics
Environment

Relationships
Teamwork
Interactions
Conflict resolution
Family systems

Workplace Skills
Dependability and
Productivity
Career choices
Transition planning

Civic and Social Responsibility

Service
Serving others
Democratic process

Diversity
Cultural expressions
Effects of prejudice
Collaboration in community

Continuity and Change
Personal and family changes
Systemic changes
Societal and cultural changes
Environmental changes
Historical changes

Arts, Language, and Literature

Critical Response
Eras and styles
Times and cultures
Aesthetic judgment
Point of view
Critique and revision
Audience response

Literature and Media
Types of literature
American literature
Diverse literary traditions
Literary elements and devices
Literate community response
Design and production

The English Language
Changes in language
Conventions
Structures of language

Non-Native Language
Speaking and listening
Reading
Writing

Artistic Process
Intent
Critique
Artistic problem solving
Exemplary works
Analysis
Perspective

Elements, Forms, and Techniques
Artistic proficiency
Visual arts
Music
Theater
Dance

History and Social Sciences

Critical Evaluation
Causes and effects
Evidence and data
Interpretation
Bias and propaganda
Public issues

History
Historical eras
Concept of time
Interconnection
Community history
Vermont history
U.S. history
World history
Traditional/social

Geography
Maps and globes
Cultures and regions
Settlements and ecosystems

Citizenship
Rights and responsibilities
Types of government
Justice and equality
Democracy

Diversity and Unity
Concepts of culture
Universal themes

Economics
Economic systems
Production, distribution, and scarcity

Conflicts and Conflict
Resolution
Social theory/problems
National and international

Identity and Interdependence
Identity construction
Levels of identity

Science, Mathematics, and Technology

Inquiry, Experimentation, and Theory
Scientific methods
Investigation
Theory
Science and math history
Roles and responsibilities

Mathematical Understanding
Arithmetic, number, and operation concepts
Geometry and measurement
Function and algebra
Statistics and probability

Mathematical Reasoning
Applications
Connections
Generalizations

Systems
Analysis
Interdependence

Space, Time, and Matter
Matter, motion, forces, and energy

The Living World
Organisms and evolution
The human body

The Universe, Earth, and the Environment
Theories
Systems
Forces

Design and Technology
Resource distribution
Technological systems
Outputs and impacts
Designing solutions

On page 6 we've printed an overview of the Framework, showing the two major sections it is divided into: the "Vital Results" and the "Fields of Knowledge." It looks complicated at first, but you will quickly understand it: the top section is the "Vital Results," which are general skills that apply to many activities. The bottom part is the "Fields of Knowledge," which are specific subjects students should know, including specific facts. The "Vital Results" are the "how" of the curriculum, while the "Fields of Knowledge" are the "what" of the curriculum.

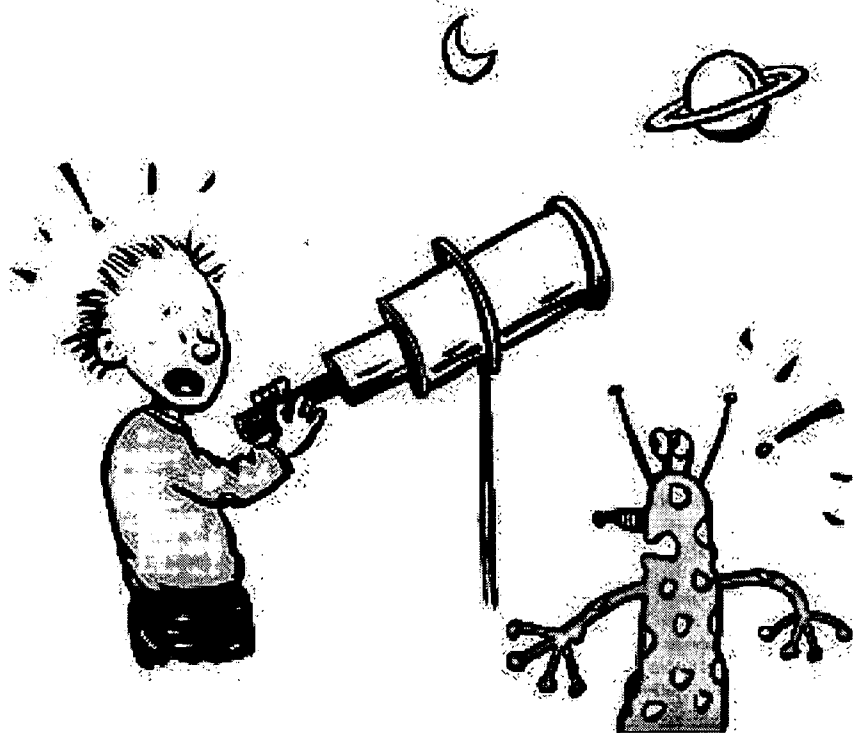
The Framework links the "skills" and "subjects" with the conditions and practices that we know are most likely to lead to success for a student. Those conditions and practices are the Learning Opportunities. By specifying these details, we have a complete learning situation and the tools we need to assess, or measure, learning appropriately.

Take a moment to look through the chart on page 6, and to imagine some of the ways you could link the Vital Results (or skills) with the Fields of Knowledge (or subjects). You may be able to see how these connect in your own daily life, as well as in your children's school work. For instance:

- A science student may use "Information Technology"—computers or the Internet—to conduct research in any project in school.

- You may use the skills of "reasoning and problem solving" when you approach "Citizenship" in your everyday life, deciding how to vote in local elections, or taking the responsibility of serving in your town government.
- We all draw on the skills we have learned in "Continuity and Change" as it relates to environmental change around us, and we apply it to our understanding of the Earth and its environment. Think of all the varied thinking and reflection skills you drew on when you first heard news of a meteor from Mars carrying fossils that may indicate signs of life!

When you use both Vital Results and Fields of Knowledge in your own day-to-day life, you are making connections. The Framework is one way that schools can encourage students to become more skillful in making connections, and to use more of their own talents and abilities in doing so.



Taking a Close Look at the Framework

Here are two actual sections from the Framework that relate to the previous example of wetlands and biology. This shows the learning possibilities for children studying science at various grade

levels. As you can imagine, the specific goals listed offer teachers many suggestions for assessing student progress, in addition to simply naming the skills and subject matter that should be learned.

Field of Knowledge Standards

Grades Pre-K - 4	Grades 5-8	Grades 9-12
The Living World Organisms, Evolution, and Interdependence		
7.13 Students understand the characteristics of organisms, see patterns of similarity and differences among living organisms, understand the role of evolution, and recognize the interdependence of all systems that support life. This is evident when students:		
a. Identify characteristics of organisms (e.g., needs, environments that meet them; structures, especially senses; variation and behaviors, inherited and learned);	aa. Identify, model, and explain the structure and function (e.g., cells, tissues, organs, systems) of organisms (e.g., plants, animals, microbes), both as individual entities and as components of larger systems;	aaa. Demonstrate understanding of the uniqueness of a cell in different organisms (plants, animals, microorganisms) and the structures and functions of the cell (e.g., chemical reactions, diffusion of materials, direction by DNA of the synthesis of proteins, regulation, differentiation);
b. Categorize living organisms (e.g., plants: fruits, vegetables);	bb. Identify and use anatomical structures to classify organisms (e.g., plants, animals, fungi);	bbb. Demonstrate understanding of how biological organisms are classified into a hierarchy of groups and subgroups based upon similarities that reflect their evolutionary relationships (e.g., plants, animals, microorganisms);
c. Describe and show examples of the interdependence of all systems that support life (e.g., family, community, food chains, populations, life cycles, effects of the environment), and apply them to local systems and	Describe, model, and explain the principles of the interdependence of all systems that support life (e.g., food chains, webs, life cycles, energy levels, populations, oxygen-carbon dioxide cycles), and apply them to local, regional, and global systems; and	ccc. Describe, model, and explain the principles of the interdependence of all systems that support life (e.g., flow of energy, ecosystems, life cycles, cooperation and competition, human population impacts on the world ecological system), and apply them to local, regional, and global systems; and
Provide examples of change over time (e.g., extinction, changes in organisms).	dd. Describe evolution in terms of diversity and adaptation, variation, extinction, and natural selection.	ddd. Explain and justify how natural selection and its evolutionary consequences provide a scientific explanation for the fossil record of ancient life forms.
<p>First graders might tell you about the insects and fish in the school wetlands.</p>	<p>Sixth graders might draw you a picture of the food chain in the wetlands.</p>	<p>Twelfth graders could describe, draw and analyze the frog's circulatory system.</p>

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Understanding Vermont's Framework

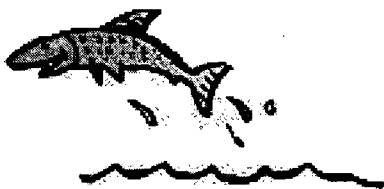
This document is called a "Framework" because, as you can see, it offers the "frame" or "skeleton" for good education but it leaves much room for local teachers and schools to "flesh it out" by deciding what and how the children will learn. This is a very important aspect of the *Framework*. It is challenging, but it does not replace local decision-making.

Grades Pre-K - 4	Grades 5-8	Grades 9-12
<p>Scientific Method</p> <p>7.1 Students use scientific methods to describe, investigate, and explain phenomena:</p> <p>Raise questions;</p> <ul style="list-style-type: none"> • Generate alternative explanations — hypotheses — based on observations and prior knowledge; • Design inquiry that allows these explanations to be tested; • Deduce the expected results; • Gather and analyze data to compare the actual results to the expected outcomes; and • Make and communicate conclusions, generating new questions raised by observations and readings. <p>This is evident when students:</p> <ul style="list-style-type: none"> a. Ask questions about objects, organisms, and events in the world around them; b. Use reliable information obtained from scientific knowledge, observation, and exploration; c. Create hypotheses for problems, design a "fair test" of their hypothesis, collect data through observation and instrumentation, and analyze data to draw conclusions; use conclusions to clarify understanding and generate new questions to be explored; d. Use evidence to construct an explanation, including scientific principles they already know and observations they make; e. Explain a variety of observations and phenomena using concepts that have been learned; Use either deductive or inductive reasoning to explain observations and phenomena, or to predict answers to questions; f. Recognize other points of view, and check their own and others' explanations against experiences, observations, and knowledge; g. Identify problems, propose and implement solutions, and evaluate products and designs; and h. Work individually and in teams to collect and share information and ideas. 	<p>Evidence PreK - 4, plus —</p> <ul style="list-style-type: none"> aa. Frame questions in a way that distinguishes causes and effects; identify variables that influence the situation and can be controlled; bb. Seek, record, and use information from reliable sources, including scientific knowledge, observation, and experimentation; cc. Create hypotheses to problems, design their own experiments to test their hypothesis, collect data through observation and instrumentation, and analyze data to draw conclusions; use conclusions to clarify understanding and generate new questions to be explored; dd. Describe, explain, and model, using evidence that includes scientific principles and observations; ee. Propose, recognize, and analyze alternative explanations; and ff. Work individually and in teams to collect, share, and present information and ideas. 	<p>Evidence PreK - 8, plus —</p> <ul style="list-style-type: none"> aaa. Frame questions that can be investigated using scientific methods and knowledge, including manipulating variables, and predicting outcomes for untested hypotheses using scientific principles; Critically evaluate the validity and significance of sources and interpretations, including scientific knowledge, observation, and experimentation; bbb. Formulate and revise explanations and models based on evidence, logical argument, and scientific principles; ccc. Propose, recognize, analyze, synthesize, and evaluate alternative explanations; and ddd. Identify problems and opportunities, propose designs and choose among the alternatives, implement solution and evaluate its consequences.

First graders could tell you the questions their class answered during the field trip, such as "What do fish eat?" and "Where do insects live?"

Sixth graders could show and explain measurements of wetland species food requirements.

Twelfth graders could design and conduct a scientific study involving the frog's circulatory system.



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Making More Connections

Here are more ways to see the connections between the Vital Results and the Fields of Knowledge: On page 6, look through "Communication" to find "Expression" and under it "Notation and representation." How can we judge when students are expressing themselves clearly? The *Framework* helps us find evidence of progress. In this case, evidence includes communicating ideas by writing or telling a story, drawing a picture for that story, or making a graph to illustrate a point. When teachers assess your child's work in school, they look for this evidence; you can also see these skills developing at home.

The charts on pages 8 and 9 will help you think about how to "Communicate" in terms of the "Fields of Knowledge," and link it to "Science: The Universe, Earth and the Environment." Using these charts:

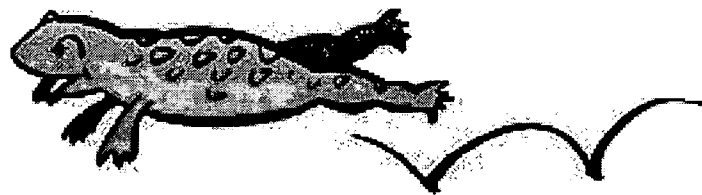
- Imagine your first grader learning about various animals that live in wetlands, and coming home to tell you about the many insects, fish and reptiles the class group observed on a walking trip near school.
- Imagine your sixth grader, having visited the same wetlands, bringing home drawings of the food chain that supports the wetlands.

- Then imagine your twelfth grader telling you about the circulatory system of a frog from the wetlands that lab partners examined in their advanced biology class, and the technology tools they used for conducting that investigation.

The students' explanations at each grade level would be significantly different and would show their progress in learning, even though they are within the same Vital Results and Fields of Knowledge areas.

Besides the student learning in relation to the Standards, this example also illustrates Learning Opportunities in action. Notice that students are involved with active learning and with learning experiences that have personal and community relevance. The example offers many opportunities for assessment, since the student can demonstrate learning through drawing, writing, information technology, graphing, measurements and analysis.

Work through this example so you can feel comfortable with the *Framework*, using your experience with students and your own learning.



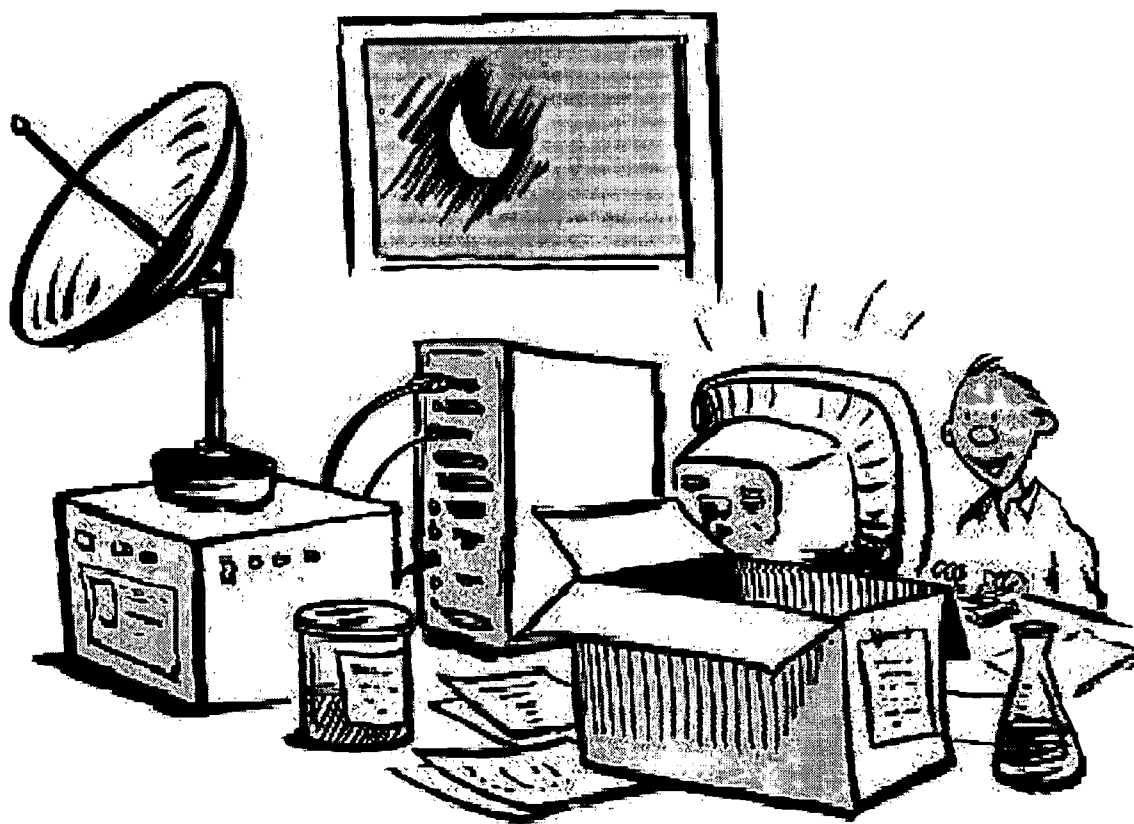
The Framework in Your School

The Vermont Department of Education has sent your school copies of *Vermont's Framework* as well as a booklet called *Core Connections*, which provides examples for using the Framework in the classroom. VISMT and the Department of Education are offering training to teachers and administrators so they can use these two booklets in implementing the Standards. We also want parents and community members to understand the Standards because you can help your children more than anyone else — at home, or by getting involved in a school committee that uses the Standards to develop or revise your local curriculum.

Often, today's classrooms have more hands-on learning, students work in teams more and teachers have more flexible "styles" than in the past. While there are many ways to teach a standards-based curriculum, there are some common features that you might see at one time or another in the classroom. These include:

- **The way the classroom is set up:** Sometimes students might be at their tables or desks listening to the teacher while at other times they are spread around the room working with tools, equipment, computers or other technology.
- **The way classes are structured:** Students might be doing different things at different times. While some students are reading, others might be working on a computer and others might be pooling information they gathered in the library or on the Internet.
- **The kind of work students are doing:** Students often try to solve real-life problems with information they gather locally. For instance, they might be asked, "Why can't we swim in the river?" "What happens to our community if the factory closes?" "What makes a bean sprout grow?"
- **The way the teacher teaches:** The teacher might use lectures to introduce the whole class to a new mathematics concept but then encourage students to do independent work while she walks around checking on their progress. She might demonstrate to a small group how to use a calculator, help students individually and in groups, guide them to discover answers rather than give answers and encourage students to question, make predictions and test out their answers themselves.
- **The way teachers and students assess or measure the learning:** Most schools are encouraging teachers to dramatically expand their assessment methods to include far more than traditional tests. This includes portfolios, student analysis, problem solving, statewide tests and much more.

- **The materials used to teach and learn:** Books and work sheets are not the only learning tools: In most classrooms the textbooks are used as resources rather than the sole source of information, and work sheets are used, if at all, to reinforce or practice a skill after students have learned it in a more "hands-on" fashion. Students also use computers, real or "homemade" scientific equipment and math manipulatives.
- **The way progress is reported:** Report cards have more than "grades": With a standards-based curriculum, the reporting of assessment results takes many different forms, including performance results on projects, class-work, tests and homework, and reports of self-assessment and teacher-student conferences.



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You Can Get Involved

Education research shows that students learn more when parents support their children's education and are involved in their school. There are things you and your neighbors can do to help teachers, principals, school board members and other school staff use *Vermont's Framework* to implement standards-based teaching and learning.

At Home:

- Above all, ask questions and talk about the way the world works. Ask your student how you might find answers to these questions.
- Engage your children in experiences that draw on the skills and knowledge they are learning in school. You can do this in the garden, in the kitchen, in the barn or at the beach. Children can estimate, measure, mix, build, tell stories or solve a problem.
- Keep track of your children's homework assignments. Showing your interest in their schoolwork will help them understand its importance and help you understand more of what they are doing in school.
- Make school a regular family topic at meal time, and keep the conversation positive and productive.
- If homework does not seem to make sense, call the teacher. Also, be sure to tell the teacher when work engages and excites your children.

At School:

- Visit your children's classroom regularly. Visits let the teacher, and your children, know you care about what they are learning.
- Help out in your children's classroom. Each of us has special skills and knowledge that can be used in the classroom.
- Volunteer for special events and projects.
- Ask questions, read school newsletters, be informed.
- Join with other parents to talk about education and school ideas and changes.
- Keep learning new things yourself.
- Communicate with teachers, the principal, other staff members and school board members at conferences, meetings and other appropriate times.

In the Community:

- Talk to friends about positive changes at school.
- Tell your neighbors about *Vermont's Framework* and statewide education improvement efforts.
- Participate in town and school meetings.
- Vote to support good education.



To Learn More...

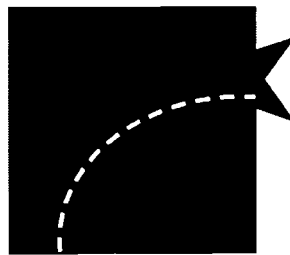
Parent and community involvement is important to us all. If you have questions on standards-based education, the Vermont Framework, or your child's education, please ask for additional documents and further explanations.

To get a copy of the Framework, contact your school or call the Department of Education at 802-828-3111.

If you'd like more information on science, math and technology education in Vermont, please call VISMT at 802-244-8768.

VISMT also has Parent and Community Guides on Assessment, Equity and other subjects.

Please take every opportunity to talk with your child's teacher, and to meet with the school principal and other staff to learn more about the Framework and how you can help your child learn.



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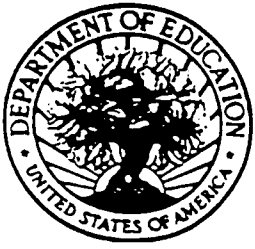
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