

Curriculum Units by
Fellows of the
Yale-New Haven Teachers Institute
Guide
2004

©2004 by Yale-New Haven Teachers Institute
Yale University, New Haven, Connecticut 06520

Contents

	<i>Page</i>
Preface.....	iii
 <i>I. The Supreme Court in American Political History</i>	
Introduction by Robert A. Burt, Alexander M. Bickel Professor of Law.....	1
Synopses of the Curriculum Units	2
 <i>II. Children's Literature in the Classroom</i>	
Introduction by Paul Fry, William Lampson Professor of English	9
Synopses of the Curriculum Units	11
 <i>III. Representations of American Culture, 1760-1960: Art and Literature</i>	
Introduction by Alexander Nemerov, Professor of the History of Art and of American Studies	18
Synopses of the Curriculum Units	19
 <i>IV. Energy, Engines, and the Environment</i>	
Introduction by Alessandro Gomez, Professor of Mechanical Engineering.....	26
Synopses of the Curriculum Units	28
 <i>V. The Craft of Word Problems</i>	
Introduction by Roger Howe, Frederick Phineas Rose Professor of Mathematics.....	35
Synopses of the Curriculum Units	38

Preface

In March 2004, sixty-five teachers from twenty-six New Haven Public Schools became Fellows of the Yale-New Haven Teachers Institute to prepare new curricular materials for school courses. Established in 1978, the Institute is a partnership of Yale University and the New Haven Public Schools, designed to strengthen teaching and improve learning of the humanities and the sciences in our community's schools. Through the Institute, Yale faculty members and New Haven school teachers join in a collegial relationship. The Institute is also an interschool and interdisciplinary forum for teachers to work together on new curricula.

The Institute has repeatedly received national recognition as a pioneering and successful model of university-school collaboration that integrates curriculum development with intellectual renewal for teachers. Between 1998 and 2003 it conducted a National Demonstration Project which showed that the approach the Institute had taken for twenty years in New Haven could be tailored to establish similar university-school partnerships under different circumstances in other cities. Based on the success of that Project, in 2004 it announced the Yale National Initiative to strengthen teaching in public schools, which aims to establish Teachers Institutes in states throughout the country.

Teachers had primary responsibility for identifying the subjects the Institute would address. Between October and December 2003, Institute Representatives canvassed teachers in each New Haven elementary, middle, and high school to determine the subjects they would like the Institute to treat. The Institute then circulated descriptions of seminars that encompassed teachers' interests. In applying to the Institute, teachers described unit topics on which they proposed to work and the relationship of these topics to Institute seminars and to courses they would teach in the coming school year. Five seminars were organized, corresponding to the principal themes of the Fellows' proposals. Between March and August, Fellows participated in seminar meetings, researched their topics, and attended a series of lectures by Yale faculty members.

The curriculum units Fellows wrote are their own; they are presented in five volumes, one for each seminar. A list of the 165 volumes of Institute units published between 1978 and 2004 appears on the following pages. The units contain four elements: objectives, teaching strategies, sample lessons and classroom activities, and lists of resources for teachers and students. They are intended primarily for the use of Institute Fellows and their colleagues who teach in New Haven.

This Guide to the 2004 units contains introductions by the Yale faculty members who led the seminars, together with synopses written by the authors of the individual units. The Fellows indicate the courses and grade levels for which they developed their

units; many of the units will also be useful at other places in the school curriculum. Copies of the units are deposited in all New Haven school libraries. Guides to the units written in earlier years, a topical index of all 1488 units written between 1978 and 2004, and reference lists showing

the relationship of the units to school curricula and academic standards are available from the Institute. An electronic version of these curricular resources is available on the Institute's Web site at www.yale.edu/ynhti/.

The Yale-New Haven Teachers Institute is a permanently endowed unit of Yale University. The 2004 Institute was supported also in part by grants from the Sherman Fairchild Foundation, the Jessie Ball duPont Fund, and the Howard Hughes Medical Institute. The New Haven Public Schools, Yale's partner in the Institute, has supported the program annually since its inception. The materials presented here do not necessarily reflect the views of the funding agencies.

James R. Vivian

New Haven
August 2004

I. The Supreme Court in American Political History

Introduction

The Supreme Court has played a significant role in American political history; but there is considerable dispute about the actual practical effects of its rulings, about the desirability of any clearly demonstrable effects, and about the democratic legitimacy of its interventions. Our seminar examined landmark Court decisions, both in our past history and in our own times. We considered *Marbury v. Madison* (1803), the foundational ruling for judicial authority; *Dred Scott v. Sandford* (1857), which attempted to rebuff Northern attacks on slavery and, many would say, helped to provoke the Civil War; *Brown v. Board of Education* (1954), which overturned state-sponsored race discrimination and, many would say, precipitated the modern Civil Rights movement; *Roe v. Wade* (1973), which invalidated state abortion restrictions and fueled a continuing national political and social controversy; *Bush v. Gore* (2000) which made George W. Bush president and, many would say, cast an aura of illegitimacy over his accession; *Grutter v. Bollinger* (2003) which upheld race-based affirmative action admissions policy in universities; and *Lawrence v. Texas* (2003), which overturned state laws criminalizing consensual homosexual relations.

The curriculum units prepared by the Fellows address some specific aspect of the Supreme Court's work. Some of the units directly deal with the cases we discussed — John Buell on the *Dred Scott* decision; Sharron Solomon-McCarthy on *Hammer v. Dagenhart* and the Child Labor Law cases. Other units focus on some other specific area of the Court's work — Peter Herndon on separation of church and state; Joan Rapczynski on the Warren Court generally; Joanne Pompano on disability rights; Joanna Ali on reproductive rights, specifically as applied to the human cloning controversy; Thomas Leaf on free speech issues in public schools. And two of the units address more general themes that apply to the entire range of the Court's work in American democracy — Priscilla Luoma on the cultural significance of the Constitution as an expression of the ideal relationship between the individual and society; and Mnikesa Whitaker on the language of Supreme Court opinions as a window on shifting political imagery, with specific reference to the historical evolution of the social status of African-Americans.

All of the units provide a rich perspective on the basic underlying question that we considered in our seminar discussions — that is, the actual practical effects of Supreme Court rulings, the desirability of any such effects and the legitimacy of the Court's claim to authority in resolving these intensely disputed issues.

Robert A. Burt

Synopses of the Curriculum Units

04.01.01

A Clone of Your Own: The Legal Issues and the Future of Genetic Engineering of Humans, by Joanna Maria Ali

This unit is intended for a senior honors or Advanced Placement Biology class and will require about two to four weeks to complete, depending on the students' aptitude and prior knowledge. The New Haven Public Schools Science Curriculum demonstrates a commitment to the discussion of current science events among its teachers and students. The questioning of modern biological techniques and the discussion of its social and moral implications is a vital part of a science curriculum; this includes any legal issues that may arise. The bullets to be covered in the unit stem from the Connecticut Common Core of Teaching and Learning and were adapted by The New Haven Public School science curriculum committee. They include:

1. Preparing and defending a position on the ethics of genetic engineering;
2. Preparing persuasive writing on gene splicing and cloning;
3. Preparing and delivering oral presentations on possible benefits and problems of recombinant DNA technology.

The objectives of this unit are as follows:

Students will be able to define cloning, including the various types

Students will be able to construct a timeline of the history of cloning (1880 to present)

Students will be able to simulate the processes of bacterial cloning (recombinant DNA) and reproductive cloning.

Students will be able to research and evaluate landmark court decisions and legal precedents to develop an argument as to whether a person has the right to clone oneself.

(Developed for Human Anatomy, grade 12; recommended for High School grades 10-12)

04.01.02

The Supreme Court and American Society: The *Dred Scott* Case, by John Buell

The *Dred Scott* decision has long played an important role in the U.S. History Curriculum. The case helps to define in stark terms the conflicts over race and slavery that were leading the country into civil war. It also represents a chance to consider the Supreme Court and its role in American society. Despite its great importance in government and society, the Court is a mystery to most high school students. This unit

explores the legal and political issues behind *Dred Scott*, the legal arguments of the case and the public response to the case. It also looks at a case from recent years in which the Court also played a role in a divisive political conflict. Students will find that many issues concerning the proper way for the Court to wield its considerable power are still with us. Students will learn the identities and political leanings of the current members of the present day Court and draw parallels between it and the one that decided *Dred Scott*.

(Developed for U. S. History I, grade 10; recommended for U. S. History and Civics, grades 10-12)

04.01.03

In God We Trust: Public Schools and Religious Freedom, by Peter N. Herndon

Most Americans today agree that the United States should not have an established church and are opposed to religious persecution in any form. There is still wide disagreement among citizens on the proper role of religion and religious expression in our public schools. How high is the so-called "wall of separation" of church and state? Has the United States Supreme Court totally removed prayer and the Bible from public schools, or do students still have a limited right to freedom of religious expression? What are the legal limits and guidelines for respecting the minority point of view? Is God a proper subject for discussion in the public schools or not?

This unit is written for middle or high school students in United States History, Government or Civics classes. The unit documents some of the history behind the current debate about religious freedom and the public schools, beginning with the colonial period when required religious instruction promoted Christian values and virtues as a way of passing these values down to succeeding generations of children. After the Constitution was ratified, established churches gave up their control over public education, but religious values were still widely promoted and reading the Bible was encouraged in schools. It wasn't until the 1960s that the Supreme Court struck down compulsory school prayer and Bible readings as violations of the establishment clause of the Constitution. Students engaged in this unit will discover why people on both sides of the religion debate have fought so hard to protect their freedoms. Should it matter that the phrase "under God" remain in the Pledge of Allegiance? Does it matter that some find offensive any mention of God in a public setting? The issues in this unit will challenge my students to appreciate the protections of the law, and the freedom to express their personal values and opinions in a public school setting. The Lesson Plan section focuses on the issues surrounding the 2004 Pledge of Allegiance case and the "moment of silence" laws; documents for teachers are included.

(Developed for Civics, grade 10, and Law, grade 12; recommended for U. S. History I, grade 10, and Civics and Law, grades 10-12)

04.01.04

Exploring and Applying First Amendment Rights in the Classroom, by Thomas Leaf

New Haven's English Language Arts Frameworks are moving in a direction more concerned with a student's ability to use a schema set of skills and abilities to analyze and evaluate any text, fictional or non-fictional, for its informational and artistic value. While lamented by some, this approach does not preclude a teacher's ability to expose students to new forms of literature and enhance a student's appreciation and understanding of that literature. Indeed, if a student can develop his or her abilities to read and interpret a text and directly link that text to personal beliefs or experiences, then that student will be well equipped for various future challenges. One means of achieving this objective is to expose students to texts that are very pertinent and contemporary to their lives and contain language that forces them to read and work at the upper limits of their reading skills.

There are many Supreme Court cases that discuss the Constitution's language on Free Expression, but two in particular deal with the First Amendment within a school. These two cases are *Tinker vs. Des Moines School District* and *Hazelwood School District vs. Kuhlmeier*. In *Tinker*, the Supreme Court ruled in favor on the side of the student's ability to freely exercise their right to free speech within limits. In *Hazelwood* the Supreme Court ruled in favor of the school's ability to control and censor student expression within a school newspaper. These two seminal cases have set a precedent in our courts today as students confront limitations on their ability to express themselves in different situations. By reading excerpts of the Court's opinions and considering their meaning through text-rendering the students will understand the particulars of the case and practice reading and writing skills consistent with New Haven's Framework Standards. These skills will be fully assessable in a hypothetical case where students must decide the merits of the case and write their own opinion supporting their decision. While the hypothetical case and the written assessment represent a scaled down and simplified version of a court opinion, the skills practiced give the student an opportunity not only to read primary source documents about the First Amendment but also to grapple with them in a realistic and literary manner.

(Developed for English 2 and English Language Arts, grade 10; recommended for English Language Arts, grades 10-12)

04.01.05

Who Put the You in Utopia?, by Priscilla L. Luoma

This unit explores the role of the individual in American society. This unit fulfills several of the requirements for the American literature survey course taught in the junior year. The unit was written for honors-level students but can be modified for varying levels.

The unit covers three time periods: the Puritan Period, the Age of Reason, and modern contemporary America. Each reading assignment addresses in some way the importance of the individual in his society. The unit provides opportunities for students to practice a variety of skills in reading, writing, speaking, listening, and viewing. The primary objectives are for students to (1) gain an understanding of the historical contexts presented; (2) gain familiarity with the true nature of the debate around the roles of the government in relation to the people; (3) recognize the theme of the individual in society in varying contexts, (4) explore human nature and its relationship to the law; (5) identify literary elements and techniques; and (6) apply their new knowledge to their world. In order to meet these objectives students will consider the historical information in this unit as well as read supplemental information in the classroom textbook. They will begin with the concepts of *Puritanism* and *utopia* as they read John Winthrop's, *A Modell of Christian Charity*, in which he describes his ideal "city upon a hill." The major text for the unit is Nathaniel Hawthorne's novel, *The Scarlet Letter*. This text lends itself to literary analysis and portrays the ideals of Winthrop's society in action. The unit moves chronologically into the Age of Reason and includes works by Benjamin Franklin, pre- and post-revolutionary rhetoric and documents such as the Declaration of Independence and the Constitution of the United States. The role of the individual becomes a primary interest as the government is established in relation to the individuals it governs. The unit moves forward to address the impact of the Supreme Court case *Brown v. Board of Education* on America's evolving ideology, especially with respect to the principle of equality and the changing strategies for interpretation of the Constitution. Finally, the film *Fahrenheit 9/11* brings the theme of the individual in society into the present, and questions the actions of the government in relation to the "consent of the governed."

(Developed for English, grade 11; recommended for English, grade 11)

04.01.06

The Americans with Disabilities Act, the Supreme Court and Self-Advocacy by Joanne R. Pompano

The Americans with Disabilities Act (ADA) is a landmark federal law which protects persons with physical or mental disabilities from discrimination. Signed into law on July 26, 1990, the ADA prohibits physical barriers in employment, public accommodations, transportation, housing, telecommunications, recreation, health services, voting, and government services. This civil rights statute guarantees that Americans with disabilities will have the same protection against discrimination that is provided to other individuals on the basis of race, color, national origin, sex and religion.

The ADA has been litigated numerous times since it became law in 1990. In 1999, for instance, the U.S. Supreme Court ruled that correctable conditions, such as the ability to improve vision with eyeglasses, do not qualify under the guidelines of the ADA. And recently the Supreme Court ruled on a case that pertains directly to the ADA. This case, which considers access to state buildings, will be a powerful starting point for curriculum development, discussion and examination of the rights guaranteed by the Constitution.

This topic will allow students the opportunity to focus on a subject important to their community and will allow them to gain skills necessary for self-advocacy. The students will gain an understanding of the laws that pertain to their disabilities and the way the Supreme Court defines these rights.

(Developed for Resource, Visually Impaired, grades 9-12; recommended for Civil Rights and Constitution, grades 9-12)

04.01.07

The Legacy of the Warren Court, by Joan Rapczynski

This unit examines and analyzes some of the major decisions of the Warren Court, which dominated American politics to varying degrees from 1953-1969. Teachers will be able to use this unit in their Civics course when examining the Constitution or chronologically when studying United States History.

The unit has three objectives. The first objective is to examine the background of the Chief Justice of the Supreme Court, Earl Warren. Students will come to understand how your background and life experiences may often reflect on behavior and attitudes in later life. What experiences in the life of Earl Warren might have influenced his

decisions on the Supreme Court? The second objective is to have students trace and understand the development of the *Brown I* and *Brown II* cases. Teachers will find an explanation of the phrase "separate, but equal." The final objective of this unit is to have students analyze and understand some of the landmark cases of the Warren Court that affected criminal procedure. Cases to be examined include *Gideon v. Wainwright*, *Escobedo v. Illinois*, *Miranda v. Arizona*, and *In Re Gault*. The Warren Court is known for its active defense of the rights of people accused of crimes, and teachers should find these case studies helpful when studying the Bill of Rights.

(Developed for Civics and U. S. History II, grade 11; recommended for U. S. History I, grade 10, and Civics and U. S. History II, grade 11)

04.01.08

The History of Child Labor in the United States: *Hammer v. Dagenhart*, by Sharron Solomon-McCarthy

What is the role of the Supreme Court in American History? How do past Supreme Court rulings affect our lives today? Whether or not you could answer these questions in part or in whole, it is our job as educators to inform students of the judicial process and how it has evolved over time since the signing of the Constitution in 1787.

From the first days of the United States, the Supreme Court has been fundamental in interpreting our Constitution and shaping our government as we know it today. The unit that I have devised looks at the role of the Supreme Court as it relates to child labor. My main focus is to examine the onset and progression of child labor leading up to the Supreme Court case of *Hammer v. Dagenhart*, 247 U.S. 251. Students will gain an insight into the responsibilities and precedents the Supreme Court sets for the entire United States.

This unit is recommended for students in seventh grade with and without special needs. The lessons integrate assorted methodologies of learning such as auditory, visual and kinesthetic. The lessons will be clear and concise for a greater understanding of the historical facts.

(Developed for Social Studies, grade 7; recommended for Social Studies, Middle School grade 7)

04.01.09

What's In a Word: Investigating the Language of the *Brown v. Board* Era, by Mnikesa Whitaker

The state and national standards in the English curriculum (and the assessments that measure them!) are focusing more and more on students' fluency. That is, we are becoming more concerned with students' ability to *investigate* written material and to express their discoveries creatively and in a way that shows that they have thought through the material critically. This is a challenging process for students to master; a big part of the problem is that many people are simply not consciously aware of the power of "the word." As we look at one aspect of our country's political history, and the evolution of the language it has employed, we will develop a deeper awareness of *what's in a word*.

This unit will focus on what I have called the "*Brown v. Board* Era." That is, our study will be a comparative one that seeks to analyze the propaganda before, during and after this landmark decision. It is imperative to investigate the connection between language and pictures (That is, what *pictures* do an author's words conjure up and why? And what *words* do certain pictures conjure up?) To this end, we will look at advertisements from newspapers, magazines, and television; the transcripts of court proceedings; transcripts of radio broadcasts. What we must remember is that, regardless of our position on the issues surrounding this case, there are two sides—each seeking to persuade the other that their side proves the most beneficial. If we are able to analyze documents from all sides of this case, we will begin to see the shift in word choice. That is a key concept that I hope we can uncover together: words have power because authors have choices. The author dictates that choice and his choices are based on the message he wants to bring to a community.

(Developed for English, grade 8; recommended for English and Language Arts, grades 8-12)

II. Children's Literature in the Classroom

Introduction

In preparing to write this introduction I knew that my colleague Traugott Lawler had taught a seminar seven years ago on "American Children's Literature," and I read his introduction accordingly. The first thing that struck me was that he had four units written on "war," but I have only one, on the Civil War. This may be because Professor Lawler focused on topical books for older children. We too read the well known Ann Petry and Mildred Taylor titles, together with Sandra Cisneros and Tony Johnston; but for the most part we read a sampling of British (and French) as well as American "classics" for all ages, including the very young.

Despite the eclectic range of the seminar, however, the Fellows were ever mindful of their classrooms, and the ten wonderfully teachable units here assembled reflect that focus. Teachers browsing for ideas will find here an incredible wealth of plot summaries and lesson suggestions with obvious immediate applications. Many of these Fellows are extremely well versed in the theory of reading development, while others have a sophisticated interest in such ethical topics in the education field as self-regulated learning and the influence of teaching on social development. There is also a strong interest in multicultural issues. Four of the units emphasize the value of working with just one author, usually in conjunction with the idea that reading a "series" of one sort or another is a kind of happy addiction that can lead to an addiction to reading itself.

We start with two units on multicultural fairy tales. Christine Elmore presents stories from a variety of cultures, together with a clear taxonomy of what a fairy tale is and how it can vary-ideas for teachers that children can also learn and benefit from. Yolanda Trapp offers a unit on Cinderella stories from many cultures (hundreds exist, as she found), featuring the chance to learn from variations on a theme, together with social studies applications.

Next come the two units chiefly interested in the use of children's literature for teaching behavior and development. Elisabeth Johnson chooses an array of books that enhance her well-informed pedagogical goal of "self-regulated learning," whereby children come to understand the value of teaching themselves and learn how to motivate themselves. Dyanne D'Angelo uses a variety of "problem" books for young children in order to model problems in behavior and socialization, with strategies the books suggest for solving these problems.

Then comes our main cluster: four Fellows have written units implicitly or directly extolling the virtues of working with a single author, or a series by a sequence of authors, to improve reading skills and further the love of reading. Diane Huot has expressly addressed the question of why children (and adults) prefer to read serial books. Her unit includes a very helpful ranking of many series, according to mandated guidelines, from easiest to hardest.

Jean Sutherland stresses the potential of detective fiction for training many parts of the mind (logic, reading, social understanding, and sometimes scientific understanding), while usefully describing detective chapter book series that feature multicultural teams of child-sleuths.

Geraldine Martin adds the color of her legendary skills with puppetry and ventriloquism to the project of teaching very young children across the curriculum with Else Minarik's "Little Bear" series. Martha Cavalieri develops the very interesting concept of teaching interpretation skills to below-grade-level 7th-grade readers by creating a "critics" roundtable discussion of the Dr. Seuss books-allowing students to use their advancing ability to think while unimpeded by their slow progress in reading.

The two remaining units are *sui generis*. Lisa Omark has written *our* unit on war, the Civil War, emphasizing works of fiction and non-fiction featuring individual actors on both sides and in all stations, that can supplement the textbooks, with useful plot summaries of an impressive variety of titles. And finally, Yel Hannon Brayton, who teaches creative writing to high school students, has put together an imaginative roller-coaster of a unit on the human place in the eco-system that features a sequence of bovine characters (cows, bulls, oxen, bison) viewed through a variety of literary perspectives, with special emphasis on Native American folkways.

Paul H. Fry

Synopses of the Curriculum Units

04.02.01

Multicultural Fairy Tales —The Stuff of Magic, by Christine Elmore

Fairy tales from all over the world hold great appeal for children of all ages and backgrounds. They are stories filled with magic, high adventure, humor, gripping suspense and lavish settings. They allow children to identify with the hero or heroine in the arduous battle against evil where the 'good guy' usually wins in the end.

I plan to use a selection of fairy tales from around the world as the basis of my curriculum unit in order to help my third-graders develop valuable insights into different cultures and their values. I also hope to lead them to the realization that there are identifiable universal themes of honesty, courage, etc., that all people share. These tales will, no doubt, be less familiar to American children and, in that sense, new and fresh, and so, hopefully, they will cause my students to make connections with some of the more familiar fairy tales with which they grew up.

This unit is divided into 5 sections:

Section I	The Genre of Fairy Tales
Section II	Fairy Tales Featuring Princes, Princesses and Magical Transformations
Section III	Fairy Tales Featuring Dragons
Section IV	Fairy Tales Featuring Kind Talking Animals
Section V	Writing a Fairy Tale

This unit will be interdisciplinary in scope (incorporating reading, writing listening, speaking, drama, art and social studies skills), and will, I believe, provide stories of high interest that will motivate even the most reluctant reader and writer. A good fairy tale leaves us spellbound, as if by magic. That, I think, is its real value.

(Developed for Reading, Writing, and Social Studies, grade 3; recommended for Reading, Writing, and Social Studies, grades 2-6)

04.02.02

Representation of Ethnicity through Fairy Tales: Cinderella, by Yolanda U. Trapp

Young people discover who they are by coming into contact with literature (folk tales, fairy tales, family stories, oral fables) They link their personal lives with those of the characters in the stories. Children are allowed to experiment with their feelings

through the exercises of recreating the narratives they hear. Who does not cry at the death of Charlotte in *Charlotte's Web*?

This unit will provide different opportunities for examining the representation of ethnicity in one of the most popular and widespread tales: "Cinderella," studied in detail and read in different versions from China, Korea, France, Vietnam, Israel, the Native American tradition and Egypt, in order to explore different cultural aspects of the story. The unit makes teaching and learning personal, with the student the worker rather than the receiver of teacher-delivered instructional services. In listening to, telling, reading, writing, and adapting the stories, the students will be prepared to master the important tasks targeted in the lesson objectives, while they explore ethnicity.

(Developed for Language Arts, Science, Social Studies, History, and LRE Students, grades 3-5; recommended for Language Arts, Social Studies, and ESL History, grades 3-6)

04.02.03

The Hero in Me: Reinforcing Self-Regulated Learning as We Connect to Literary Heroes, by Elisabeth Johnson

This unit is designed as an introduction to developing a self-regulated learning dialogue in the classroom. The concept of self-regulated learning reconfigures the teacher controlled classroom to refocus power on the student. It emphasizes the development of independent learning and self-monitoring, attempting to redefine the teacher as coach or facilitator as opposed to manager or ultimate authority.

Through participation in this series of lessons, students should develop a beginning framework and vocabulary they can use to approach academic, social, and problematic tasks. Along with vocabulary, students will begin to acquire a reservoir of concrete examples that reinforce the usefulness of these behaviors in fiction stories and non-fiction texts they read. The ultimate goal of this unit is that students begin to transfer these behaviors from concept to practice. Essentially, the unit is constructed to slowly scaffold students so that by the end of the unit, they can work to solve a task or problem with at least one new learning tool, i.e. finding the hero in themselves.

(Developed for Reading and Language Arts, grade 4; recommended for Reading and Language Arts, grades 4-5)

04.02.04

Conflict Resolution through Classic Storytelling, by Dyanne D'Angelo

My unit, *Conflict Resolution through Classic Storytelling*, utilizes age-appropriate literature that is related to conflicts children may encounter throughout social development at that age. The goal of my unit is to develop literacy skills and problem-solving skills through retelling selected story elements. The unit focuses on specific characteristics of social development such as (1) understanding consequences of good versus poor behavior, (2) dealing with aggression and other emotional behavior, (3) developing responsibility, (4) self-directed learning and problem solving, and (5) developing self-worth.

My unit promotes child development through literature, which can play a significant role in a child's life, if one selects the appropriate text. The unit introduces literature that students can relate to and allows them to make connections to the environment in which they live. The literature chosen reflects the stages of language, cognitive, personality and social development of our students and allows them to understand conflicts or situations that the characters in the story are subjected to and how they resolve their problems in a specific manner. These selections address the needs of a child throughout the maturing process and influence their understanding and response to literature.

Integrating social development with literacy will help to increase self-concept, and identity. Keeping with the state standards of reading, this unit encourages students to become storytellers by retelling the stories they hear to their peers or families and identifying with the stories they create.

(Developed for Elementary Language Arts Literacy, grade 1; recommended for Elementary Language Arts Literacy, grade 1)

04.02.05

Getting Serious about Reading in a Series: A Unit of Study, by Diane M. Huot

This unit is written for second and third-grade students but can easily be adapted for the middle school grades. The unit includes a discussion on early series of children's books, together with the advantages and disadvantages of reading books in a series. I have included reviews of ten series from the second through fourth-grade reading levels. I chose an early second-grade beginning series to model the Think-Aloud Strategy in my mini-lessons because of its transitional reading level. A list of thirty-five leveled reading series is also included. This unit will be taught in six weeks during the middle of the third grade year. The structure of the unit will consist of

studying the set-up of the book and the set-up of the series, finding what information/idea is constant and growing throughout the series, and using one series to help read another. The main goals of this unit are to motivate children to read more books and to improve comprehension and performance on the Connecticut Mastery Test.

(Developed for Reading, grade 3; recommended for Reading, grades 3-4)

04.02.06

Using Diverse Children's Detective Fiction to Build Comprehension Skills by Jean Sutherland

The primary activities of this unit present various lessons related to children's detective fiction. They begin with simple riddles and end with the reading and examination of an entire chapter book. These activities attempt to train students to recognize various bits of information that they can use to assist them in drawing conclusions, making predictions, solving problems, and, generally, in achieving a better understanding of the situations being presented in the text that they are reading. Throughout the unit, activities are aligned to New Haven's Content and Performance Standards for reading. The unit also makes an effort to use children's detective fiction containing characters representative of a multicultural society. The contents are geared primarily for a third or fourth-grade classroom, but could be modified for some middle grade students.

(Developed for Reading, Language Arts, Social Studies, Science, and Social Development, grade 4; recommended for Reading, Language Arts, Social Studies, Science, and Social Development, grades 4-8)

04.02.07

Friday and Friends: A Journey with Else Holmelund Minarik's Little Bear Stories for the Young Child, by Geraldine Martin

In my unit I present strategies that are used with puppetry for presenting the art of storytelling, via Minarik's Little Bear stories. The unit aims to foster a love for reading. The books can easily be used as an extension to one's classroom reading curriculum. The stories are brief yet entertaining, and the illustrations are detailed and engaging.

The unit, whose primary purpose is to enhance the reading curriculum in the classroom, will also stimulate discussions such as the dilemmas that Little Bear and his friends face in the stories. Children will contrast them to situations that they face in their own lives.

Puppets including Mr. Friday will assist the children in reading the stories. The children will retell stories through their own puppet creations and illustrated words. Various graphic organizers, story maps, and journals will also help the children in remembering and interpreting the little bear stories. Creative works will include an animated movie, drama production, and a Grandmother's Tea.

The unit includes activities suitable for children in kindergarten through third grades with an emphasis on literacy for the first grade child.

(Developed for Reading and Language Arts, grade 1; recommended for Reading and Language Arts, grade 1)

04.02.08

Seuss for Seventh Graders: Identifying Explicit and Implicit Themes within the Works of Dr. Seuss, by Martha C. Cavalieri

This unit attempts to teach higher level thinking skills to students with lower level reading skills. Seventh-grade students, who normally scoff at infantile books such as Dr. Seuss, will become literary critics who learn the value of interpretation as they discuss, debate, and determine the explicit and implicit themes found within five of Dr. Seuss' "message books": *The Sneetches*, *The Lorax*, *The Butter Battle Book*, *Horton Hears a Who*, and *The 500 Hats of Bartholomew Cubbins*.

Through teacher modeling and guided practice, middle-school students will read a biographical sketch of Dr. Theodor Seuss Geisel and take an in-depth look at the literary concept of *conflict* which plays an important role in his later books. Within small groups students will read the chosen books, discuss CMT-based questions (focusing on main idea, theme, and author's purpose), brainstorm possible themes, and practice the skill of summarizing. Further into the unit, small groups will reform, compare and contrast the themes found in each book, and work on a collaborative theme-related final project to present as a group.

Teaching adolescent students requires a delicate balance of visualizing each student as a blossoming young adult capable of critical thinking while also recognizing that each "young adult" is not quite as confidently capable of higher level literary skills. This unit plays on the dichotomy of our adolescent students, pushing them to recognize the literary voices hidden inside.

(Developed for Language Arts, grade 7; recommended for Reading and Language Arts, Middle School grades 6-8)

04.02.09

His Story, Her Story: Voices from the Civil War in Children's Literature, by Lisa Omark

This is a nine-week literature unit designed to complement a sixth grade study of the Civil War. The goal of this unit is two-fold: first, students will know the time-line of the war, mastering the objectives described by the National Standards for United States History. This timeline is the backbone of the study as it provides each student with an overview of the war and is a framework for personal and content connections. Second, students will select and read quality works of literature set during the Civil War, the "his stories and her stories." The culminating project of the unit will be "The Scrapbook Project" in which students collect, process, and display information on ten self-selected characters they have met in the literature. This scrapbook will contain four pages on each of the ten characters. These pages will display information about who each character was, where and how he/she lived, and his/her role in the war. The goal of the project is to give students a format to connect the characters' stories with their own and with the events of the Civil War, thereby strengthening their understanding of these dark years in our nation's history.

(Developed for Literature, grade 6; recommended for Literature, grade 6)

04.02.10

Sacred Cows for High School Creative Writing Students, by Yel Hannon Brayton

The *Sacred Cows* curriculum unit uses stories and information about animals - mainly cows and bulls - to discuss various themes that deal with human behavior and serve as inspiration for writing assignments. The unit begins with a light-hearted look at cows mirroring human foibles in the children's story *Click, Clack, Cows That Type* and several Gary Larson cartoons. It then focuses on ideas about food and eating. We will read "To Serve Man," a short story by Damon Knight, which challenges human arrogance with respect to our place in the food chain.

The unit progresses to themes that deal with hunting and survival and uses historical information about early hunter/gatherers for whom there appears to have been mutual reverence and a sense of reciprocity in sacrifice where animals were concerned.

Contrasting such sensibilities, we will read another short story by Richard Connell, "The Most Dangerous Game," wherein the hunter becomes the hunted.

We explore issues of greed in viewing the film *Dances With Wolves* wherein a viable food source - the buffalo - is on the brink of extinction because of the fur trade and the Sioux are equally endangered by the U.S. government. Students will also learn about

the infamous massacre at Wounded Knee and the Christian/Indian hybrid religion of the Ghost Dance. Lastly, the unit ends with the children's book *The Story of Ferdinand*, a story about integrity and peace.

The reading and writing exercises and projects in this unit have been designed to make students aware of a sense of *place* in their writings and to develop situations and characters that speak to philosophical concepts of sacrifice, reverence, and renewal.

(Developed for Creative Writing, grade 10; recommended for Creative Writing and Language Arts, grades 9-12)

III. Representations of American Culture, 1760-1960: Art and Literature

Introduction

These units show how to combine the study of art and literature in the classroom. The course descriptions are geared to the elementary, middle-school, or high-school levels, but all feature an attention to visual art as a key facet of students' education. All feature too a belief that *close analysis*—learning to look attentively at one thing, be it a painting or a short story or a poem—is vital.

In what follows, readers will encounter not only a variety of American artists, writers, and events, but also a number of helpful suggestions about how to look closely at individual works of visual and literary art. In a culture in which images move past us at a dizzying rate, in which the instant access to overwhelming amounts of information has never been greater, these course descriptions offer an antidote of sorts: the chance for students (and teachers) to stop and look at individual works of art and literature, even at specific *details* in these works. There is a trust implicit in this purpose. The seminar proceeded with this idea in mind: that with the right methods, the right patience and praise, the ability to discern something closely and imaginatively can be a source of pleasure and pride to students of all abilities. Consequently none of the units here is a broad survey touching on dozens of things and none of them closely. Only two of the units touch on Thoreau's *Walden*, but the spirit of that book suffuses much of what you will find here: the virtues of singular and prolonged acts of attention, of speaking and writing about that attention; and the discovered sense of self that might arise from that attention.

Alexander Nemerov

Synopses of the Curriculum Units

04.03.01

American Genre Painting in the Nineteenth Century: Teaching Artistic Interpretation as a Tool For Critically Viewing History, by Justin M. Boucher

My unit on genre paintings and artistic interpretation was developed in response to the fact that there is very little art offered in my school. Aside from that, students are rarely taught how to interpret art, even if they receive basic artistic training. Therefore I decided that I would create a unit which dealt with artistic interpretation, couched in historical critical analysis.

The unit offers the students the opportunity to view and analyze art while learning the skills to do so. It progresses from basic viewing to a deeper understanding of art in general through various comparisons and guided viewings of paintings. The topical focus of the unit (daily life in the United States during the antebellum period) fits nicely into a U.S. History curriculum, while leaving room for application elsewhere.

(Developed for U. S. History I, grade 10; recommended for U. S. History, grades 8-11)

04.03.02

Exploring Colonial America through Art and Literature, by Kristin Carolla

Comprised of eight lesson plans, my unit was designed to create a more vibrant and exciting history class by supporting historical information about colonial America with both paintings and literature. The unit includes historical back-ground that will enable the student to understand the religious, social, and economical perspectives of colonial America. As educators, we must expose children to a variety of modalities in the hope of addressing their multiple intelligences.

By integrating art into the literary realm and teaching children to observe, analyze, and synthesize both art and literature, we are broadening their horizons and exposing them to a world that could stimulate their senses and imagination, thus furthering their desire for knowledge.

Students approach text-rendering by making connections, predicting, figuring out, visualizing, *noticing*, and asking questions. It seems necessary to approach art in a similar manner: children become active participants in the interpretation of art by noticing the images, colors, hues, shading and lighting, *figuring out* the artist's message, *making connections* to historical events, personal experiences, literature, and

art, *asking questions*, and *predicting*. This method will allow students to begin to think about art in a more analytical manner and to actively engage in a quest for knowledge.

(Developed for Social Studies, grade 5; recommended for Social Studies, grade 5)

04.03.03

Immigration and Photography: The Case of Lewis Hine, by Giovanna Cucciniello

The goal of this unit is to introduce students to documentary photography and how it records the life and conditions of individuals and their communities; to help students develop an understanding of how photographs are constructed; and how documentary photography can express a point of view. The materials used will be Hine's photographs *Climbing into the Land of Promise*, Ellis Island (1905); *Looking for Lost Baggage*, Ellis Island (1906); *Climbing Into America* (1908); *Children on Street*, Lower East Side, N.Y.C.

This unit is intended for intermediate fluency ESL students. Students will be encouraged to translate into English the initial verbal reactions to the photographs in the unit. Lessons will later focus on developing vocabulary, written and verbal expression.

This unit will introduce photography in three stages: first by introducing a brief history of photography; second, by focusing on the life and works of Lewis Hine; and third, by discussing the subject of immigration as a theme in photography and allowing students the opportunity to compare, contrast and photograph their communities.

(Developed for ESL, grade 4; recommended for ESL, grades 4-8)

04.03.04

Art and National Identity: Analyzing Painting and Literature from the Era of Manifest Destiny, by David DeNaples

There are two purposes to each lesson in this unit. Although the first is the development of a skill and the second is based on absorbing content, they are not mutually exclusive, nor should the unit be thought of or taught as two separate components. It will be my responsibility, as author of this curriculum (and the responsibility of any subsequent teachers who choose to apply this curriculum to their classrooms), to search for the richest content to further the growth of skills.

The content I expect my students to understand is American history, specifically examining art produced during the period of 19th century continental expansion and its relationship to the national identity of that time. The role of art as it relates to national identity could certainly be explored in other nations as well. Could the sentiments of politicians and orators be found in the paintings of the time? How did the artists represent such sentiment? These are examples of the types of questions I will apply to the selected pieces of art discussed below.

Through writing critically about their analyses and interpretations of both art and history the students will become better overall writers, benefiting them in all later classes. Writing skills are not a unique demand of the English teacher, but for some reason teaching writing has become a unique responsibility of that teacher. I am certain that many English teachers would agree with the idea that students need to learn writing in all the major disciplines and not just in their English or literature classes.

In *A Short Guide to Writing about Art*, Sylvan Barnet reminds us that when students are to write critically they "often think that they are writing for the teacher, but this is a misconception: when you write, you are the teacher." Hopefully, this unit will prove to be especially effective because of the method chosen. The analysis of works of art will enable the students to actually "do" history — *they* will make interpretations based on *their* observations.

(Developed for World History, grades 10-12; recommended for Social Studies, History, and Art, grades 9-13)

04.03.05

How to be an Individual: Analyzing Society's Influence on Us through Art and Literature, by Mary K. Donahue

"Why should not we also enjoy an original relation to the universe?"

-Ralph Waldo Emerson

This unit will interweave skills used to understand art and literature with the hefty idea of taking charge of oneself and becoming aware of choices one can make to be an individual.

In this unit, students are pushed to look objectively at society and make decisions about the differences between themselves and the 'whole.' We focus on individual choice and concepts related to conformity. Through studying several great American authors such as Ralph Waldo Emerson and Henry David Thoreau, the students first take an in-depth look at literature of the mid-1800's and begin to develop an idea of

the themes and questions that these authors were engaged with. Then through a series of experimental assignments, the students branch out into thinking about themselves as part of the whole of society: their beliefs about how they should live come into question and we work toward trying to 'discover' the individual. After that, the students will be introduced to a series of paintings that fit under three headings: "The Individual," "Conforming to Society," and "A Functioning Society." We will learn to 'read' a painting as one does an essay or short story, and from there we will deepen our understanding and mirror those themes on individuality that we have already laid the groundwork for.

(Developed for College English, grade 10; recommended for College and Honors English, grades 8-12)

04.03.06

A Bird's Eye View of the Caribbean: Art, Folklore, and Music (A Supplement to African American Studies), by Lorna Edwards

Crystalline waters, exotic plants and flowers, lush vegetation, tropical paradise! These are terms frequently used to describe the Caribbean islands that stretch from Florida to the coastland of South America. This interdisciplinary unit is a continuation of the story of the African Diaspora with a focus on the Caribbean islands. The unit will begin with students learning about the Caribbean region's geography, history, and culture by exploring visual and performing arts. Students will analyze and interpret paintings by two American artists, Winslow Homer and Jacob Lawrence, as well as Caribbean works seen on Internet sites. Students will also be exposed to other cultural expressions in the Caribbean as they tune their ears to the sounds of salsa, meringue, calypso, and reggae music. As students share in the use of oral tradition, they will not only gain a better understanding of life in the Caribbean, but they will also compare and contrast the African and Caribbean versions of Anancy stories and determine how these folktales have changed as they journeyed across the Atlantic Ocean. Selected literature will enable students to understand how immigrants from the Caribbean assimilate in the United States.

Some teachers might want to place a greater emphasis on other subjects than on music, art or storytelling. I have included in the narrative some information and suggestions that Social Studies and Language Arts teachers might find useful as students explore the topic from a more historical perspective. Topics range from colonization by European nations to slavery, slave rebellions, and pirates (both male and female). The final assessment of the unit will require students to select a medium to explain life on a Caribbean island of their choice. They may choose to write a storybook, create an animated cartoon or a photobiography (documentary). Dance students may retell the

story through dance with the aid of a narrator. Another option is to write an I-Search paper describing what students learned about the Caribbean. It is my intention that upon completion of the unit, students will have developed a greater appreciation for people living in a world that is similar to, yet, at the same time, different from theirs.

(Developed for Language Arts, grades 7-8; recommended for Reading, Language Arts, Social Studies, and Visual and Performing Arts, grades 6-8)

04.03.07

The History of African American Children: A Guide for Teaching Black History at the Elementary School Level, by Jennifer Flood

The goal of this unit is to teach elementary school students about black history through the eyes of children. Students will develop an awareness to build upon as they grow and mature. Resources include pieces of art centering on African American children and literature related to the pieces. The focus is on desegregation. To lead into desegregation, the unit briefly touches upon slavery. The unit will conclude with a celebration of diversity.

Art and literature were carefully selected due to the sensitive nature of the topic. This unit is intended to make students aware of black history without depressing them or instilling fear and anger. By the end of the unit, students will have an appreciation for black history and a realization of how far African Americans have come. It will help students realize that there is hope for an even better tomorrow.

(Developed for History and Art, grades K-4; recommended for History and Art, grades K-4)

04.03.08

The Invisible People: American Art and Literature Represents the Marginalized and Disenfranchised, by Sandra K. Friday

The aim of this unit is to teach skills for discerning American culture through paintings, sculpture, murals and photographs, enhanced by short stories, poetry, storybooks, and documentaries. Just as we continue to design strategies to teach students the skills for *text-rendering*, so I have designed strategies to teach students skills for *art-rendering*, or for *visual* literacy.

Students can apply the rubrics I have designed to the various genres that will allow them to open the art that represents invisible people, groups, and movements in our culture such as: a fifteen-foot-tall bronze sculpture by Elizabeth Catlett memorializing Ralph Ellison and his autobiographical *Invisible Man*; southern sharecroppers,

portrayed in the documentary *Let Us Now Praise Famous Men* by James Agee and Walker Evans, eking subsistence from the land in the 1930's; and Civil Rights demonstrators marching to meet "Bull" Connor on a bridge in Birmingham, painted for posterity by Jacob Lawrence. Students will also practice using text-rendering rubrics as they read literature to enhance the art.

American art and literature will provide the content, while the rubrics for text and art-rendering and writing will arm students with skills and strategies for future learning. The final project requires students to re-create a piece of art or create art of their own that represents an individual, group or movement invisible to the majority of our society. They will apply the art-rendering rubric to their own piece and, using this rubric, present their work to the class.

(Developed for a team-taught English and Social Studies course with English and Social Studies teacher, grades 9-12; recommended for American Literature, English, American History, Social Studies, and History, grades 9-12)

04.03.09

In the Footprints of Lewis and Clark: 19th Century Artists' Depictions of Native Americans, by Sean Griffin

This unit is designed to accompany a reading of excerpts from Stephen Ambrose's *Undaunted Courage*. Upon completion of the reading I ask students to examine various artists' depictions of Native Americans from the time of Lewis and Clark to the end of the 19th century. Examining the depictions will provide for an interesting extension of the Lewis and Clark expedition reading. The unit will provide students the opportunity to use art in their academic class, one of many goals at my school, an arts magnet school. Students will be encouraged to look closely at a number of artists' paintings including works by Charles Bird King, George Catlin, Seth Eastman, Karl Bodmer and others. Students will discuss the artwork as a class, reflect in journals and, in the final project of the unit, create their own interpretations of Native Americans during the nineteenth century.

(Developed for English Language Arts, grade 8; recommended for English Language Arts, grade 8)

04.03.10

Discovering American Identity through Writings and Paintings, 1800-1845, by David Reynolds

This is an *art and literature* course, using pioneering methods of teaching *both* in order to make some difficult texts, and a difficult period of American history, more exciting and accessible to students who usually find this material challenging if not downright off-putting. The selected readings and paintings span America's development from the end of the Revolutionary War to the Civil War.

The Revolutionary War gave birth to the American nation, the Constitution, and a newly formed society of American citizens. This period, known in part as the Era of Good Feeling, was characterized by optimism among many Americans — if not those native to the country or enslaved within it — and the crossing of frontiers. The U.S. was growing, and in the process a national identity began to emerge. Yet despite the unifying effects of the Revolutionary War, the Constitution, and the Bill of Rights, American citizens remained divided on how to view society, life, and purpose. Some held on to the Puritan ideal, others embraced the wild unexplored West, while others remained enslaved in the capitalist American system. Through diverse, influential paintings and writings, this unit explores the development of American identity in its infancy.

(Recommended for U.S. History and Literature, grade 10)

IV. Energy, Engines, and the Environment

Introduction

We examined issues related to energy, engines and the environment, all of which permeate many aspects of our life and are becoming more and more cogent, as we face short- term and long-term energy crises. This seminar was offered under the premise that a group of educators, the Fellows, would be able to adapt a scientific and sometimes dry subject to a broad student audience, encompassing kindergarten and high school students, capitalizing on a wealth of both traditional and Web-based resources. Many of the Fellows had little or no science background.

The seminar series began considering energy fundamentals. Key concepts included various forms of energy, work and heat as energy transfer, conservation of energy, first and second laws of thermodynamics, all of which are typically dealt with in thermodynamics. Such a discipline tends to be rather dry and often turns off even advanced students. The identification of some introductory books and Web sites helped the Fellows wade through this material.

We then examined a variety of energy conversion systems, starting with traditional fossil-fuel based engines, such as steam engines and internal combustion engines, and their cycles. Despite the press coverage of new and revolutionary approaches, I believe that fossil fuel energy systems will be the dominant source of energy for at least several more decades. In the near term, efforts should be made to make it cleaner and more efficient rather than overselling pie in the sky alternatives as a panacea for the energetic problems of the planet. We also examined a broad range of energy conversion examples, including recent innovations, such as fuel cells, hybrid gasoline/electric engines, solar energy systems and wind farms. Although more and more fashionable, at the present time and for the foreseeable future, they cover only niche markets of the world's energy.

The third component of the seminar series focused on the issue of sustainability and the environment from an energy perspective. We discussed pollution from the various energy conversion systems, the big picture and what it will take to address world energy needs in the long run.

The Fellows absorbed these materials and adapted it not only to traditional science curricula, as expected, but, to my surprise, also to curricula in social sciences, art and history. Examples of the latter cover disparate topics ranging from the effect of energy harnessing on coal-mining culture, to the consequences of the advent of heat engines on the growth of cities in America, to the aesthetics of designing form and

function around machines, to how to use energy responsibly in the context of food consumption and the obesity epidemics in children. Even poems were written to stimulate young children in the teaching of an often abstract topic. The originality of some of the units developed from a science seminar was inspirational.

Alessandro Gomez

Synopses of the Curriculum Units

04.04.01

Energy Generating a Culture: American Coal Miners and Coal Mining Culture, by Matthew Bachand

Washing machines, televisions, air traffic control towers, and the Panama Canal all have one thing in common: they each require tremendous quantities of energy. In America's free market system, many believe that the end-consumer is the one who absorbs all of the costs of the procurement of energy. In a sense, this may be true - each of us who purchases a commodity inherits a fraction of the costs incurred before reaching us. However, this does not tell the whole story of a commodity's journey. In the case of electricity, entire (sub)cultures have developed out of the profits generated by - and the costs incurred in - the generation of energy for consumers. One important example of this truth is coal mining culture.

This unit will introduce students to the lives of coal miners through scientific, historical, and literary texts in both print and electronic media. Sources will include investigations of coal industry titans to regulators and anecdotes describing children's worries for their fathers in the mines. Students will take away an empathetic understanding of what it takes to make their lights come on in both technological and human terms. Moreover, they will be able to articulate the contribution that coal miners make to our society through multiple performances of understanding: written, pictorial, and dramatic.

(Developed for English, grades 10-11; recommended for English and History, grades 10-12)

04.04.02

Las Maquinas y Nosotros: Machines and Us, by Abie L. Benítez, Ph.D.

This unit introduces the concepts of energy, machines and engines. Although the principles surrounding thermodynamics are complex it is imperative that students at this early age become familiar with this topic. The concepts of heat, work, and energy - viewed as everyday phenomena present in engines and machines - make an abstract topic more relevant and easier to understand and relevant. Using hands-on activities, simple demonstrations and learning centers this unit explores the sources of energy, both renewable and non-renewable. The use of journal writing establishes a medium through which the students can expand their English language expression. My students are English- and Spanish-dominant students participating in a two-way immersion program that promotes science inquiry. This unit was developed with the

intention of enhancing the science curriculum in second grade. As a curriculum and staff developer I will implement this curriculum as part of my modeling and coaching for teachers in the classroom. For two weeks for approximately an hour period I will meet with my students at their assigned classrooms. A final project will include a written collection of scientific and historical observations.

(Developed for Integrated Science, grade 2; recommended for Science, Social Studies, and Language Arts, grades 2-5)

04.04.03

Simple Machines, Engines and the Environment, by Raymond Brooks

The focus of this unit is on small group instruction and contains a variety of resources where a student can research background information for his/her topic. This background material will provide the student an opportunity to look at his/her project in a variety of ways and help them decide on the focus of their project.

In most cases, the student involvement with physical science has been very limited. This lack of background is a reason why we will rely on computer-animated programs and aim to find a mentor qualified to help them in their area of interest.

This unit begins by talking about and understanding what work means to the science community. The next step is to introduce and/or review the 6 simple machines:

- The Lever
- The Inclined Plane
- The Pulley
- The Wedge
- The Screw
- The Wheel and Axle

This is an important step as simple machines are basic to all machines.

The next section deals with internal (car) and external (steam) combustion engines. The basic operating procedures are investigated in detail through websites.

The unit ends by discussing the environmental impact of automobiles and how the world is trying to alleviate some of these problems.

(Developed for Science Fair and Science, grades 5-8; recommended for Science and Physical Science, grades 5-8)

04.04.04

Energy in a Clean Environment, by Matthew Cacopardo

The unit "Energy in a Clean Environment" is designed for a ninth-grade integrated science class. The topics of energy, work and power are included. The class will begin by covering what energy is and its various forms. The relationship of work and energy will then be discussed. We will then correlate the units used to describe energy, work and power such as calories, joules and watts. A discussion will follow on our current energy use and acquisition and conclude with the issues of alternative and sustainable energy sources while looking at various sources' advantages and disadvantages.

(Developed for Integrated Science, grade 9; recommended for Integrated Science, grade 9, and Physics, grade 11)

04.04.05

Industrial Revolution in America: Exploring the Effects of the Heat Engine on the Growth of Cities, by Judith S. Goodrich

I have developed this unit to help students learn to think critically and understand the complexity of historical developments. The unit requires students to connect an abstract notion of progress to a concrete body of evidence related to the Industrial Revolution in America. The unit focuses on how the introduction of heat engines into the local setting during the Industrial Revolution affected cities around America in the 19th and early 20th centuries. Students will explore the impact that mechanical innovation has had on the shaping of American society.

Students will connect the harnessing of energy (water, steam, combustion and electricity) to the notion of progress and its good and ill effects on the environment and on patterns of urban growth in American history. Students will answer an essential question: *Is the history of the growth of a city a history of progress?*

Students will review the meaning of work, energy, heat, and engines; they will have the opportunity to make their own steam-powered engine; students will think about how heat engines fueled by steam, gas, and coal changed the urban environment; and finally students will research, digest and react to their gathered information by creating a PowerPoint presentation and by writing essays to demonstrate what they are thinking and what they have learned.

(Developed for Social Studies, grade 8; recommended for Social Studies, grade 8)

04.04.06

Energy and Work: Transformation through Engines, by Crystal LaVoie

This unit is intended to be used during the Integrated Science Curriculum for ninth graders, but could be adjusted for use during the sixth grade physics curriculum or for an upper level physics elective. It is meant as an introduction to the physical concepts of energy and work, and gives a broad overview of this content. It uses the four-stroke engine as an in-depth analysis of energy conversion to achieve work. The unit was written with both state and district standards in mind and has as its central philosophy, teacher-as-guide and student-as-learner. This unit also emphasizes hands on instruction and assessment by exhibition.

Key terms: energy, work, heat, conduction, thermodynamics, potential energy, kinetic energy, chemical energy, mechanical energy, thermal energy, combustion, electrical energy, reactants, products, transformation, conversion, conservation, temperature, mass, speed, gravity, motor, engine.

(Developed for Integrated Science, grade 9; recommended for Integrated Science, grade 9, and Physical Science, grades 6-12)

04.04.07

Energy All around: Energy in Our Lives, by Pedro Mendia-Landa

This unit is anchored in the science vision statement of the New Haven Public School curriculum standards and frameworks. The principal objective of this unit is to use an interdisciplinary approach to prepare creative, critical thinkers who are able to use the scientific method and other problem-solving techniques as we study energy and the environment. This unit will provide the elementary school teacher in a dual language program with a framework that closely matches district-wide goals of literacy and numeracy to the study of energy, engines, and the environment focusing on integrated language arts, math, science, and library/media curricular standards. The list includes standards in the areas of scientific inquiry, life science, technological science, ecology, and historical perspectives in science.

This unit focuses on energy by allowing children to explore and become familiar with different sources of energy, its acquisition, transport, and how its use affects the environment and our lives. Through the use of concrete examples that contextualize and make meaningful a few energy principles and processes involved in their day-to-day living, students are able to understand how energy is an essential and integral part of why things work. Therefore, as we uncover and discover the world that surrounds us, we explain the reasons that the different forms of energy work the way they do and how it affects our everyday life in the classroom and at home.

A list of student, teacher, and electronic resources is provided for the implementation and extensions of the unit.

(Developed for Integrated Language Arts and Science/Social Studies, grade 2; please see Guide entry for recommended courses and curriculum areas)

04.04.08

Energetic Energy: A Child's Guide to Responsible Energy Use, by Kathleen Rende

This unit is designed with kindergarten-age students in mind, but can be easily adapted to the curriculum of first and second grade. The students will explore the idea of energy and three types of energy and engines. They then will apply that knowledge to their own lives. The students will relate the idea of fuel to an engine by making responsible choices about the foods they put into their own bodies. The idea of energy creating work, then waste will be introduced through their bodies, and then applied to engines and the environment.

(Recommended for Integrated Science, grades K-2)

04.04.09

Fueling around with Energy: A Comparative Study of Conventional and Renewable Energy Use among Nations, by Ralph Russo

For most of us living in the developed world, mastery of energy appears as simple as turning a key or flipping a switch. Such seemingly effortless tasks are the triumph of ingenuity. Yet their simplicity should not trivialize the progression of innovation that led us to this point in history, nor should it obscure understanding of the fundamental process by which our energy is extracted from the environment. *Fueling around with Energy* is an attempt to connect high school history students with realities of the environmental, economic, and political characteristics of the energy process in developed countries and the developing world. In completing this unit students will conduct a comparative study of conventional and renewable energy use in developed countries and in the developing world.

The unit fits in the world history curriculum in the "Perspectives on the Present" unit offered by McDougal Littell in the *Patterns of Interaction* textbook. It can also be used in any twentieth century history, current events, and/or international relations class. United States history classes can incorporate this in the study of U.S. society since World War II. Science teachers may also use parts of this unit to supplement a more scientific investigation of energy called for in an earth science or integrated

science class. An interdisciplinary unit can easily be crafted in the simulation activity *World Energy Summit*. Students can be organized to investigate, explore, and present integrated analysis combining scientific and historical data, narrative prose, and calculations. This might be ideal to use in high school freshmen cluster programs that encourage interdisciplinary activities among core subjects.

In general, this curriculum unit seeks to promote student achievement toward mastery of state and city social studies program goals. More specifically activities of the unit are planned to address New Haven Social Studies Curriculum expectations, content strands, standards, performance, principles of teaching and learning, and social studies skills. An attempt has been made to include activities that are integrative and value-based. Moreover, lessons incorporate problem solving, organizing information, effective communication, and effective collaborative work. References to the New Haven curriculum are noted throughout the unit.

(Developed for World History, grade 9; recommended for Middle and High School World History and Current Events, grades 7-12)

04.04.10

Machines: Designing Form and Function, by Sara E. Thomas

This unit will teach students about renewable and nonrenewable sources of energy using boats as a vehicle. I would like students to create their own model of a boat with a simplified steam engine. Students will work as industrial designers: choosing the function of their boat, drawing up blue prints, working through a series of models, determining how to increase efficiency, and finally addressing the aesthetics of the boat as a form. This unit will be appropriate for all students because it accommodates a variety of learning styles, most specifically kinesthetic learning. It will enforce everyday skills such as problem solving, creating and testing a hypothesis, measuring, analyzing data and applying the elements and principles of design.

(Recommended for Art, grades 9-12)

04.04.11

Fossil Fuel Sources, Usage and Alternatives: What Are the Options? by Susan S. Van Biersel

The overall goal of this unit is to explore different fossil fuel sources, present-day usage of fossil fuels, and the impact they have on the environment. We will also investigate alternatives to fossil fuels, and possible solutions to the negative impacts fossil fuels have on the environment. Students will explore simple engine models. There will be significant emphasis placed on trying to open the students' eyes to the

critical energy situation we are in today, and how it will affect their lives if not seriously addressed.

Though the unit has been designed for a ninth- and tenth-grade Earth Science section, with modifications it could lend itself to most any level science curriculum. Parts of the unit could also be molded to fit into a twentieth century history class, examining changes in American life since the industrial revolution and the advent of the automobile. A political science curriculum might incorporate sections of the unit as they examine the domestic and international implications of energy policies.

This unit will closely follow the standards set forth by the New Haven Public Schools science curriculum. In particular the unit addresses content standard 1.0, scientific inquiry, standard 3.0, life science, and standard 6.0, ecology.

(Developed for Science, grades 9-10; recommended for Science and Social Studies, grades 9-10)

V. The Craft of Word Problems

Introduction

The premise of this seminar was that word problems play a key role in learning mathematics. More specifically, they provide occasions to give concrete interpretations to the compressed symbolic language of mathematics, and thereby help the student access the power of this language. In this view, the act of translation, from common language into mathematical symbols in order to solve a problem, and then back again in order to interpret the solution, is a key aspect of doing the problem, as important in the learning process as the solution itself.

The seminar used a variety of sources to examine the role of problems in the mathematics curriculum. Magdalene Lampert's account of a year of teaching a fifth grade class (*Teaching Problems and the Problems of Teaching*; Yale University Press, 2001) was read as an example of a way to approach mathematics instruction exclusively through problems.

Sixth grade mathematics textbooks from Singapore were studied both for their well-constructed problem sets and for a specific highly effective diagrammatic method of solving a wide variety of problems.

We also considered broader curricular issues related to word problems. The kind of knowledge needed to teach mathematics well, and in particular, to deal with a wide variety of problems, both mathematical and pedagogical, is explored in the book *Knowing and Teaching Elementary Mathematics* (Erlbaum Associates, 1999) by Liping Ma. The data for this study was gathered through interviews in which teachers were posed problems situated in the classroom. The interaction between arithmetic and algebra, and types of arithmetic problems which can be used to promote algebraic understanding, were discussed in the book *Thinking Mathematically* (Heinemann, 2003) by T. Carpenter, M. L. Franke and L. Levi. The seminar Fellows who teach at the primary level also found that the earlier book, *Children's Mathematics* (Heinemann, 1999) provides an interesting discussion of how very young children approach simple arithmetic problems.

Much of the seminar time was taken with analyzing specific problems, both for their own interest, and as part of larger systems. We especially focused on understanding how a given topic can be explored through groups of related problems. This involves analyzing how the given problems are related to each other, their similarities and differences, and asking how the problems together articulate a given topic, or set of topics. In the seminar, the process of analyzing connected

configurations of problems was referred to as *exploring the problem space*. This was the organizing principle for the units created for the seminar. Each unit assembles a collection of problems, and discusses how these problems together explore a given topic. The topics addressed frequently key parts of the mathematics curriculum.

Michele Murzak and Roberta Mazzucco have created sets of problems to explore subtraction with renaming. Jennifer Ulatowski has constructed a set of problems with the goal of enabling students themselves to create word problems. She has provided a detailed analysis of the structure of each problem.

Diane Powers provides a sequence of lessons which introduces students to aspects of per cent. Sheila Wade investigates the use of the number line in dealing with fractions and percents. Joyce Bryant has collected a variety of problems constructed by her students, as well as some she constructed herself. These are accompanied by an essay on the importance of problem solving. Carolyn Kinder has devised a set of problems with the ambitious goal of advancing student understanding of the key properties of the basic operations, also known as the Rules of Arithmetic.

Luis Matos constructs problems which deal with ratio and proportion. Susan Gudas's substantial collection of problems again takes up the issue of percent, now at a more comprehensive level appropriate for 8th grade.

Finally, Anthony Wight presents us with a wide-ranging collection of problems which touch on a number of topics, from arrangements of blocks and counting problems, through various problems of "Singapore type" and several kinds of rate problems.

Each author has accompanied his/her collection of problems with a discussion of the subject area which the problems explore, and sometimes comments on how the problems fit together or how they address the subject.

Every collection of problems is a work in progress, always open to adaptation and refinement. The selection and refinement of a set of problems to address a given topic with effectiveness and insight may be a gradual process, carried out over a period of years.

Problems may be added, deleted, or modified according to the needs of a given lesson or a given class. Problems may be selected from a larger group according to specific needs. It is hoped that teachers will find valuable material here for various purposes. One may borrow a set wholesale, another might select an individual

problem. Some may modify some of these problems to their own needs, or be inspired to create a new set of problems. All these uses would further the basic goal of the seminar: to encourage use of word problems in mathematics instruction.

Roger E. Howe

Synopses of the Curriculum Units

04.05.01

The Relationship Between Addition and Subtraction in Problem Solving by Michele Murzak

Problem solving and word problems seem to be a universal concern at all grade levels. Students see a word problem and feel overwhelmed and nervous. They tend to use the numbers that they see, guess the operation, solve it, and move on. Problem solving is a "life skill." It is a skill that students will use in their everyday activities and careers.

It is important that students understand how to solve word problems. Students must follow steps when solving a problem. This unit is designed for my second grade class, but can be used and modified for grade three. The unit touches upon many important ideas/concepts in problem solving. The concepts that I focus on are as follows:

Place Value

Addition and Subtraction (within 10) Fact Families

Addition and Subtraction (within 20)

Addition and Subtraction with and without regrouping Strategies for solving word problems

I have combined what I learned at the seminars from my colleagues, what I learned through my experience as a teacher, and what I learned from my seminar readings. In my unit I discuss books written by Liping Ma, Marilyn Burns, Magdalene Lampert, and T. Carpenter.

(Developed for Mathematics, grade 2; recommended for Mathematics, grades 2-3)

04.05.02

Developing Word Problems: A Student's Task, by Jennifer Ulatowski

This unit is designed to teach students how to decipher the mechanics of word problems and then ultimately create their own. It also focuses on the importance of mathematical discussions within the classroom, both for the student and for the teacher. The methods and strategies explained in this unit will aid the students by giving them a systematic way to look at and solve each individual problem.

The students can then assess their own knowledge of how to solve word problems by writing their own for their peers to solve. For students to write a coherent problem,

they need to understand and apply the proper mechanics. These strategies provide a tool for the students to use not only during the course of this unit, but also during the course of their school career and of course on standardized tests like the CMT.

(Developed for Elementary Mathematics, grade 3; recommended for Elementary Mathematics, grade 3)

04.05.03

Solving Word Problems Using Subtraction, by Roberta Mazzucco

This unit was written for use in a third-grade classroom, but it can be helpful to those teaching second-, fourth- and perhaps even fifth-graders. The unit is concerned with a persistent problem that children have in dealing with subtraction: renaming. In reading some of the research done on teaching math it is apparent that mastering a skill in math like renaming is predicated on a number of other tasks like understanding place value, addition and subtraction of numbers under 20, understanding the reciprocity that addition and subtraction share, as well as being able to differentiate among types of problems and figure out possible solutions. The unit suggests a scaffolding of skills that students need reinforced if they are to be successful with renaming. The unit also offers a few sample lessons and a bibliography for teachers. Problems are offered as one possible path for the teacher and students to follow. The unit also lists the math standards it covers.

(Developed for Mathematics, grade 3; recommended for Elementary Mathematics, grades 2-4)

04.05.04

The Art of Interpreting Percent, by Diane Elizabeth Powers

The goal of this unit is to introduce, support, and expound on the meaning of percent for fifth-grade students. I utilize many problem solving strategies to teach students that the "meaning of percent" is per 100. Percent means per hundredths. Therefore, one whole is equivalent to 100 hundredths. Any percent less than 100 hundredths or 100% is equivalent to a fraction with a value less than 100%.

When a percent is greater than 100% it represents an equivalent improper fraction. This curriculum should be utilized after fractions have been taught, as I relate percent to fractions and decimals throughout the unit.

This unit provides an assortment of word problems, beginning with those for remedial students. Students that have success in solving these problems will be excited to

continue to solve progressively more difficult word problems. The word problems initially are divided into simpler parts, whereby the student can easily identify each step of the problem. Eventually, the lessons evolve into word problems utilizing formulas with algebraic equations and solving for the unknown.

Students will visualize the use of number lines indicating fractions and their corresponding percentages. There is integration of the metric system of measurement, as it relates to fractions and percentages.

Students will change fractions to decimals and percentages and vice versa. Once the foundation of percent is understood then I introduce word problems. First, students will solve for the unknown incremental part of the whole when the whole quantity and the percentage are known. Then they will solve for the unknown percentage when the whole quantity and the incremental part of the whole are known. Finally, students will solve for the unknown whole quantity when the percentage and incremental part of the whole are known.

When students are comfortable with the above calculations I introduce the whole quantity as a percentage of another quantity, followed by a lesson on percentage change. There are simple interest calculations for the borrower and the lender. The last section of the unit is a series of related, progressively more difficult word problems. All of the problems relate to the lessons and can easily be solved by following the formulas.

(Developed for Middle School Mathematics, grade 5; recommended for Middle School Mathematics, grades 5-6)

04.05.05

The Number Line as a Mathematical Tool, by Sheila Wade

This unit is designed to be taught to fifth- or sixth-grade students. The objectives for this unit are for students to comprehend the relationship of fractions and whole numbers by applying appropriate mathematical operations to solve word problems and to understand the relationship of fractions to percents. A series of word problems have been designed to be solved using a number line. Word problems with fractions and mixed numbers are presented in the first section. In the second section problems use percents and percents with fractions. Students will create a series of fraction rulers 0 through 2. Each ruler, the same length, will be marked with different non-permanent markers, one marked in fourths, another in fifths, and a third in twentieths. A fourth ruler will be used for section 2 with percents. The mathematical tool developed for

this unit is a series of blank acrylic rulers. Students will solve word problems requiring addition and subtraction of fractions and percents using number lines.

(Developed for Mathematics, Fractions, and Percent, grades 5-6; recommended for Mathematics, Fractions, and Percent, grades 5-7)

04.05.06

Problem Solving through Communication, by Joyce Bryant

This unit is developed for middle school students. Problem solving is the process by which students acquire knowledge, skills, habits, values and attitudes. They must learn to read mathematics in order to become able to use math in everyday life. Like skills, problem solving must be practiced; when it is practiced it becomes far less difficult. Some problem techniques at times are so very important, they should be the focus of instruction.

Problem solving is a challenge for the majority of our students. Real life situations, applications and interdisciplinary connections are a part of everyday lessons to be learned. Students should be led to think about concepts and then generalize about them. We should give systematic attention to the development of problem solving skills as they relate to word or story. In this unit students will learn to solve problems and be able to write word problems independently and in groups.

(Developed for Mathematics, grade 8; recommended for Mathematics, grade 8)

04.05.07

Using Basic Properties to Solve Problems in Math, by Carolyn N. Kinder

This unit focuses on the Commutative and Associative Properties of Addition, Inverse Properties of Addition and Subtraction, Commutative and Associative Properties of Multiplication, Distributive Property of Multiplication over Addition, Zero Property and the Identity Property for Addition, and the Identity Property for Multiplication. The content section of the unit is divided into sub-topics that give explanations about each topic along with a set of word problems that illustrates each property.

Lesson plans are supported by proper goals and objectives, assessment tools and resources. They are designed to engage and expose students to creative and innovative ways to exercise their critical thinking skills. A variety of techniques, such as classroom discussions, creating their own word problems, and translating word problems into equations using algebraic expressions are used to motivate students' interest in analyzing and solving word problems. This unit is framed around New Haven Standards for teaching word problems to students in grades 5-8.

As a result of using this unit, it is hoped that teachers will gain insight toward a coherent and consistent approach to teaching students how to think logically to solve word problems in math. Also included in this unit are teacher resources, a student reading list and a bibliography.

(Developed for Mathematics, grade 7; recommended for Middle School General Mathematics, grades 5-8)

03.04.08

Word Problems Dealing with Ratio and Proportion, by Luis E. Matos

During the middle school years, standardized tests begin to become more important as an indicator of future success. Whether or not the student decides to go further than high school to college is sometimes determined by middle school scores. As a consequence of this importance, student anxiety is exacerbated for many and, for some, frustration becomes more evident. This curriculum unit applies word problems as a tool for understanding ratio and proportion. The unit examines a variety of math problems; explores strategies for using them; recommends useful tools; proposes a sample procedure; and suggests resources for further research. My objective is to make my students comfortable with the language of word problems so that when it comes time to take a standardized exam, they can attain success.

(Developed for Middle School Mathematics, grades 7-8; recommended for Middle School Mathematics, grades 7-8)

04.05.09

Do the Math 100%, by Susan Gudas

Most students have a difficult time with word problems. Although they are able to compute reasonably well, their mathematical thinking skills and critical reading skills need fine-tuning.

This is a problem-solving unit involving various types of percent problems. Students will solve real-world word problems to explore percentage and its use in their everyday living. Hopefully it will make the math more engaging to them if the problems are designed to relate to events occurring in their lives. Strategies necessary for students to master in order to become better problem solvers are incorporated. The unit will include lessons in comparison/contrast, drawing conclusions, and predicting future results. Each activity will prompt students to calculate, interpret, apply and communicate math. The unit emphasizes their increased understanding of

mathematical situations. The practice they will do with this unit will increase their ability to perform on the Connecticut Academic Performance Test (CAPT) that will be taken in high school, as well as support student growth and improvement.

(Developed for Mathematics and Algebra I, grade 8; recommended for Mathematics, Percents, and Algebra, grade 8)

04.05.10

Using Algebra Word Problems to Explore Problem Space, by Anthony B. Wight

Word problems represent the "real world" of money, measurement, information, consequences and arguments. At all levels, mathematics curricula should include and embrace word problem solving. Such exercises not only review and reinforce computational skills, but also they challenge students to shift from verbal situations to patterns, tables, graphs, equations and back. Building problem sets, which explore key arithmetic concepts and relate symbols to the concrete realities of students' lives, can moderate the abstract and remote nature of "algebra" for many students.

In this unit, I briefly discuss the Vertical Team concept and its value for mathematical problem solving. Second, I introduce the idea of "problem space," a phrase frequently used by our seminar leader, Roger Howe. Third, I propose that along with our curricular sequencing we look for and practice deliberate techniques that work each year for progressively more complex and intricate problems. Students thus will be building their own "toolkits" for algebraic problem-solving skills, which they can expect to master and apply as they advance through the grades. Finally, I present and discuss several sample problem sets designed for classroom activities in developing algebraic problem solving.

(Developed for Algebra I and Mathematics, grades 9-10; recommended for Pre-Algebra and Mathematics, grades 5-7, and Algebra I and Mathematics, grades 8-10)