

Curriculum Units by  
Fellows of the  
Yale-New Haven Teachers Institute  
Guide  
2006

Contents

	<i>Page</i>
Preface.....	3
 <b><i>I. Photographing America: A Cultural History, 1840-1970</i></b>	
Introduction by Alexander Nemerov, Professor of the History of Art and of American Studies.....	5
Synopses of the Curriculum Units .....	6
 <b><i>II. Latino Cultures and Communities</i></b>	
Introduction by Stephen Pitti, Professor of History and of American Studies .....	11
Synopses of the Curriculum Units .....	12
 <b><i>III. Postwar America: 1945-1963</i></b>	
Introduction by Cynthia Russett, Larned Professor of History.....	18
Synopses of the Curriculum Units .....	20
 <b><i>IV. Math in the Beauty and Realization of Architecture</i></b>	
Introduction by Martin Gehner, Professor Emeritus of Architectural Engineering.....	26
Synopses of the Curriculum Units .....	28
 <b><i>V. Engineering in Modern Medicine</i></b>	
Introduction by Mark Saltzman, Professor of Chemical and Biomedical Engineering.....	32
Synopses of the Curriculum Units .....	35
 <b><i>VI. Anatomy and Art: How We See and Understand</i></b>	
Introduction by William B. Stewart, Associate Professor of Surgery and Section Chief .....	41
Synopses of the Curriculum Units .....	42

## *Preface*

In March 2006, sixty-five teachers from twenty-three 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 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. An evaluation of the Project concluded that the Institute approach promotes precisely the dimensions of teacher quality that result in increased student achievement. Based on the success of the Project, in 2004 it announced the Yale National Initiative to strengthen teaching in public schools, a long-term endeavor to establish exemplary Teachers Institutes in states throughout the country.

Teachers had primary responsibility for identifying the subjects the Institute would address. Between October and December 2005, Institute Representatives canvassed teachers in each New Haven public 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. Six 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 six volumes, one for each seminar. A list of the 176 volumes of Institute units published between 1978 and 2006 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. Teachers who use these units may submit comments on them at <http://teachers.yale.edu>.

This *Guide* to the 2006 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 1588 units written between 1978 and 2006, and reference lists showing the relationship of many 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/](http://www.yale.edu/ynhti/).

The Yale-New Haven Teachers Institute is a permanently endowed unit of Yale University.

The 2006 Institute was supported also in part by grants from the Sherman Fairchild Foundation 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  
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## *I. Photographing America: A Cultural History, 1840-1970*

### **Introduction**

In this seminar we focused on how to use photographs *actively* in the classroom. That is, we wanted to go beyond using photographs as simple illustrations — this is Abraham Lincoln; this is Martin Luther King, Jr.; this is the Lower East Side; this is Yosemite — and instead analyze what photographs mean and how they go about doing so. We spent a lot of time in class looking at individual photographs, studying them for prolonged periods, having conversations about them, as we tried to determine how and why the photographer chose this particular subject; how the photographer "designs" that subject, through cropping, tonality, point of view, orchestrated luck, type of camera, and many other aspects of photography as a truly creative practice. In short, we aimed to understand how photography does not so much copy the world but *invents* it, according to the imagination and historical situation of the photographer. Our discussions opened up photography for us all as a powerful medium for classroom instruction. Yes, we can use it to teach the specifics of American history, political and cultural. But beyond that, we can use it to teach our students, and ourselves, how to speak and write about the world — how to summon the right language, how to become actively, thoughtfully engaged with what we see. In curriculum units ranging from African American history to war to childhood to the environment, participants in this seminar explored the special power of *talking about* photographs (instead of merely showing them) to make the past come alive.

Alexander Nemerov

## Synopses of the Curriculum Units

### 06.01.01

#### **War Photography: Propaganda, Outrage, and Empathy, by James P. Brochin**

This unit asks students to respond to war photographs of three types: those that have been or can be used as propaganda, those which cause outrage in the viewer, and finally, those which instill in the viewer a feeling of compassion for the victims of war, of whatever nationality. History is the study of facts, who, what, when, where, and why, cause and effects, and the great themes such as hope, loss, justice, individual rights, poverty, aggression, and power. Photography has been seen to carry a "burden of truth that no other medium possessed." Such phrases as "a picture is worth a thousand words" and "seeing is believing" express the undeniability of photography. Photography, being relatively new among the expressive arts, is in its own class. Photography is expected to accurately represent what is really there to express the truth about the nature of war. Students will develop and demonstrate an ability to describe and analyze war photographs, the goal being to transform their viewing of photographs, and perhaps even their viewing of the world, from the point of view of a mere observer, to the point of view of an engaged witness.

(Developed for Journalism, grade 11; recommended for High School U. S. History, World History, and Journalism, grades 10-11)

### 06.01.02

#### **The Photographed Environment in America, by Stephen P. Broker**

This curriculum unit presents a brief history of the environmental movement in America from the 1840s to the present. The unit relies on the close analysis of nineteenth and twentieth century photographs to examine America's changing worldviews of our natural heritage and how we choose to use our lands and natural resources. These visual images, identified from several easily referenced photographic archives, introduce a series of topics that one studies in a high school environmental science course. Included among these topics are the exploration of the American West, the extraction of natural resources from the land and the sea, the exploitation of and subsequent efforts to restore and protect wildlife in America, the harmful impacts of indiscriminate use of toxic chemicals by agriculture and industry, and the degradation of the country's air, land, and water.

The photographs cited in this unit have been chosen to provoke thought and promote discussion about environmental topics. They are central to the unit's narrative description of key events in the American experience with nature, as well as to the various classroom activities that my students will conduct. In addition, the unit identifies key historical figures in the environmental movement and makes reference to some of their more important writings about nature. My intention is to portray a nation that continues to seek a workable definition of the relation between the economic and the ecological benefits of nature.

(Developed for AP Environmental Science, grades 11-12, and Honors Biology, grade 10; recommended for AP Environmental Science and Environmental Science, grades 11-12, Biology and Honors Biology, grades 9-10)

### **06.01.03**

#### **New Haven, Then and Now: A Story in Photographs, by Jennifer Flood**

Primary students' knowledge of history is very limited. A five-year-old child believes things are as they have always been. History is an abstract concept to children and a verbal explanation will not suffice. Photographs provide a means for making history much more concrete. This unit is intended to teach primary students about the New Haven of the past in comparison to the New Haven of today. Students will think about how they live their lives today and ponder what it would have been like to live at the turn of the twentieth century. Topics for instruction include play, school, transportation, and the shore. While the unit was written for New Haven teachers of grades K-4, it can be easily adapted for older students or other locales.

(Developed for Social Studies, grade K; recommended for Social Studies, grades K-4)

### **06.01.04**

#### **Gordon Parks' Photography: Breaking Down Racial Barriers with Real Life Stories, by Sandra K. Friday**

My unit on Gordon Parks' photography focuses on about a dozen black and white photographs he took during the 1940s through the 1960s, a tumultuous time of war and civil strife in our history. I have devised what I will call a *way of looking through the lens* that Parks looked through, ultimately, to sharpen my students' visual skills, understanding, and communication skills, as they interact with the photographs of Parks from World War II through the Civil Rights Movement.

The photographs I feature confirm his uncanny ability to both underscore racial prejudice and break down racial barriers with a camera.

Because the at-risk high school students I teach are most comfortable with clear expectations and a format usually in the form of a handout to begin their activities, I have crafted a set of "essential questions" that they will answer for each photograph we view. Students will participate in testing these questions out on our first photographs and make revisions if necessary. They will record their findings on a graphic organizer designed for this purpose. This, however, is just the beginning of their interaction with the photographs of Gordon Parks.

Ultimately, students will engage in their own photography project, following it through just as they have for each of Parks' photographs.

(Developed for English, American Photography, and Literature, grades 9-12; recommended for English, American Photography, and Literature, grades 7-12)

### **06.01.05**

#### **Photojournalism for Social Change, by Deborah Hare**

This is a curriculum designed for high school journalism. We will view pictures by five photographers who worked to show us the world and to effect change. These particular people made a significant impact on the world through their exploration of social conditions, through the use of photojournalism.

This unit explores the plight of the poor, and the horrors of child labor, through the work of Lewis Hine. Dorothea Lange takes us on a journey of the hardship of migrant workers during the Depression. Through observing the work of Margaret Bourke-White, whose photograph of *Fort Peck Dam* was the first cover of *Life Magazine*, we will better understand the horrors of Buchenwald, and the glory of the Chrysler building. Gordon Parks, the first African American photographer hired by *Life Magazine*, will show us the sadness of racism in the 1950s and '60s with such photos as *American Gothic* and *Norman Jr. reading in bed*.

The rising black power movement is explored as well through his portraits of both Malcolm X and Muhammed Ali. The unit ends with a more contemporary photographer, Bruce Davidson, who photographed East Harlem, Central Park, and Brooklyn gangs, thereby reflecting back the beauty of teenagers and the city amidst the squalor and stereotypes.

In addition to seeing these photographs students will read about the photographers' lives and how they became interested in the subjects they chose. We will transition from looking at photographs to becoming photographers. Students will be given cameras and encouraged to go out and explore their city and neighborhoods closely, and through their knowledge of photojournalism partake in making change in their communities.

(Developed for Journalism, grades 9-12; recommended for Journalism, grades 9-12)

### **06.01.06**

#### **A Moment in Time: Teaching Point of View Using Photography, by Roberta Mazzucco**

This unit was written specifically for a third grade class but can be adapted for use with students from second through fifth grade. The premise of the unit is that students have a difficult time choosing topics for writing, and further difficulty making them interesting because they often fail to include interesting and exciting details. Examining photos is one way to increase students' awareness of details and how point of view, whether of the writer or photographer, influences what we as the audience see and feel. By broadening their perception of the choices a photographer makes in selecting what point of view to take when capturing an image, students will gain some similar insights they can use in writing about themselves and their experiences. The unit utilizes a number of well known



photographs and photographers from Todd Webb to Joel Meyerowitz to Man Ray and many others. Appropriate comparison photos, or companion photos by the same artist, are also mentioned. Three lesson plans and a final project in which students take and share their own photos are also included. There is a dictionary of terms which are useful in speaking about photography, as well as a bibliography of appropriate books and photos.

(Developed for Narrative Writing, grade 3; recommended for Writing, grades 2-5)

#### **06.01.07**

#### **A Day in the Life: September 11 in Photographs, by Michele Murzak**

My unit will focus on images of the September 11 tragedy. The unit will integrate literacy, social studies, and art. The unit will be taught in a fourth or fifth grade classroom, but may be used in any classroom. This topic is a difficult, yet vital one to teach. There is no easy way to discuss September 11. By using photographs it will make it more "real" for the students. Students will be able to relate

and connect to the photographs. Students will examine the photographs, focusing on point of view, composition, and more.

(Developed for Social Studies, grade 5; recommended for Social Studies, grades 4-5)

#### **06.01.08**

#### **African American History: A Photographic Record, by Jacqueline Porter-Clinton**

I am a Teacher of the Deaf at East Rock School working with seventh and eighth grades for resource for one period a day and with them in the regular education setting for the remainder of the day. My schedule is flexible to co-teach in different classes. This unit is being designed for an eighth grade social studies class.

Black history is either mentioned slightly or else completely omitted from some textbooks. In partial compensation, Black history has been assigned the month of February for celebration. During this time most students are exposed to the same few prominent figures and their accomplishments, for example Harriet Tubman's Underground Railroad, and Rosa Parks' Bus Boycott. The most talked about moment is Martin Luther King, Jr.'s "I Have a Dream" speech. In the past I have chosen to read a novel about a famous black activist. This approach proved to be long and boring for the students.

This unit will teach the students to establish a purpose for viewing to gain better comprehension and to supplement their understanding of the written text. In this unit I will use a timeline of photographs to travel throughout history and highlight the African American experience — not as isolated incidents but, as they occurred, as part of United States history.

(Developed for U. S. History, grade 8; recommended for Social Studies, grades 5-8)

### **06.01.09**

#### **Photographs as Aids to Writing, by Malini Prabakar**

If you are looking for a unit to teach multiple genres of writing to middle school students, then this is the right one. This unit uses photographs as aids to writing. The background is built by historical events or movements, thereby making it interdisciplinary. Though this unit has been designed for grade six, it can be adopted/modified to suit your need.

In this unit, students analyze various photographs and interpret them from different points of view. Then they communicate their thoughts and feelings in writing. They understand the important role of primary sources in discovering the past and make connections to self, text, and the world. Using higher order thinking skills, they organize and sequence the information they glean. They identify the elements of art in photography — color, design, shapes, symmetry, texture, balance. They recognize the influence of the time period of the photographer on the style of the photograph. By analyzing the people, objects, and activities in the photograph, they make their inferences.

This unit is designed for seventeen periods of sixty minutes each but could be extended, depending on the pace of student writing. It includes graphic organizers such as the *word web*, *Venn diagram*, *circle graph*, *window organizer*, and *photo analysis worksheet*. The response starters encourage students to write different kinds of sentences and provide an opportunity for every student to be involved with writing.

(Developed for Writing, grade 6; recommended for Reading, Writing, Social Studies, and Middle School, grade 6)

### **06.01.10**

#### **We Are Part of a "Bigger Picture": Children Critically Examine Photographs, by Kathleen Rende**

Children must develop skills necessary to critically examine and evaluate information in order to become successful students. In this unit, students are taught strategies and methods to become critical thinkers. Using photographs of children, this unit allows students to view, discuss, and analyze photographs from daguerreotypes through contemporary society. As a final culminating activity, students will create their own photographs using the methods of the photographers studied. The unit was developed for a second grade classroom with English language learners but can be adapted for any elementary classroom.

(Recommended for Social Studies and Language Arts, grade 2.)

## *II. Latino Cultures and Communities*

### **Introduction**

The units that follow explore topics related to Latino cultures and communities in the United States. Each offers a stimulating guide for thinking about the place of Latin Americans in this country, and each in its own way represents a response to the changing nature of twenty-first century Connecticut. These units emerged in a time of considerable national and international debate about Latinos, about undocumented immigration, and about the enforcement of national borders, as our spring 2006 seminar coincided both with Congressional efforts to reform immigration regulations and with massive political demonstrations throughout the United States about immigrant rights.

In this context, the ten teachers who designed these units worked hard to understand Latino history over the past century, they debated contemporary topics such as bilingual education and labor unionism, and they read the work of influential scholars, poets, and fiction writers who have attempted to represent Latino experiences. The authors of these units thus grappled with the changes underway in the present day as well as the longstanding presence of Latinos in the United States. By crafting a diverse set of units related to Mexican American, Puerto Rican, Cuban, and other U.S. communities of Latin American origin, and by taking on subjects ranging from music to food, muralism to civil rights, these teachers authored a collective response to conditions in the contemporary urban Northeast. Their careful efforts reflected a deep, rather than a crisis-driven, engagement with important issues, and if their work suggests only a fraction of the countless topics that might have developed under the rubric of "Latino cultures and communities," it should be said that theirs is an impressive fraction, an exciting set of units which respond to the growing number of Latino students in local classrooms.

Stephen J. Pitti

## Synopses of the Curriculum Units

### 06.02.01

#### **The Mexican and Chicano Mural Movements, by María Cardalliaguet Gómez-Málaga**

As a result of this unit, students will learn about the renaissance of public mural painting in Mexico after the Revolution (1910-1917) and how Diego Rivera, José Clemente Orozco and David Alfaro Siqueiros, the three main figures of the Mexican mural movement, turned what could be considered revolutionary propaganda into one of the most powerful and significant achievements in art during the twentieth century. Students will recognize the importance of images and how art reflects and influences the social, political and cultural development of society. We will explore the relevance these artists had internationally, and how they trespassed boundaries when assigned different projects in the United States as part of Roosevelt's New Deal. We will then move to the young Chicano artists and activists, who developed a very strong movement to support social activism during the 1960s. We will focus on learning how this Chicano movement developed and how to comprehend and interpret the symbols Chicano artists represented.

The unit is recommended for Spanish students with at least an intermediate level of fluency since it is going to be conducted in Spanish.

(Developed for Spanish, grades 11-12; recommended for Spanish 3 and 4, grades 11-12)

### 06.02.02

#### **What is Latino? Using Latino Writers to Help Define an Emerging American Identity, by John J. Donahue**

Through this curriculum, juniors and seniors in an English course in an urban high school form theories about the meaning and usefulness of the term "Latino" using selections from notable writers of the past who could be called Latino. The curriculum covers ten such selections over five weeks and requires a one-page paper from each student in response to each selection, with help from class discussion and larger concepts introduced by the teacher. Lesson plans are designed for an eighty-minute block period in which the typical class is divided into thirds, with 25 minutes for reading and note taking, 25 minutes for class discussion, and 25 minutes for completing the writing assignment. The readings are all taken from one anthology, *The Latino Reader*, edited by Harold Augenbraum and Margarite Fernandez Olmos, and comprise a selection of mostly Puerto Rican writers who portray four kinds of experience found in Latino literature — immigrants making a new life in the United States, adults and children wrestling with the continuum of languages between English and Spanish, Latino adolescents discovering American social boundaries for the first time, and writers using poetry to assert individual identities in the face of the resistance or neglect of the majority.

(Developed for Multicultural Literature, grades 11-12; recommended for Multicultural Literature and English, grades 11-12)

### **06.02.03**

#### **¿Dónde Estábamos? Where Were We: Using Oral History to Teach Immigration, by Tina Pedrolini Caplan**

This curriculum unit seeks to achieve three primary goals: to address the lack of information regarding Latino culture and history in the regular social studies curriculum; to give students the opportunity to explore the history that unfolds all around them; and to encourage at-risk students with little interest in the social sciences to become more interested in the world around them. The unit seeks to do this first by providing students with a basic outline of the history of Latino immigration, with an eye towards understanding the reasons for the migration in the first place. The unit also spends time comparing early twentieth-century European immigration with the more contemporary issues surrounding Latino

immigration. Second, students will take what they have learned and apply it by conducting oral history interviews throughout the Latino community of Fair Haven. The goal is for students to interest all manner of people in the community: professionals, politicians, business owners, as well as their own parents, grandparents, and classmates. At the conclusion of the unit, students will document their oral histories in a book that will provide a portrait of the twenty-first century Latino community in New Haven, Connecticut. The unit addresses several New Haven Public School district standards in social studies.

(Developed for Social Studies and World Cultures, grade 7; recommended for Social Studies, grades 7-12)

### **06.02.04**

#### **Civil Rights Struggles in the Latino Community, by Judith Goodrich**

This unit uses court cases and Supreme Court decisions to introduce an awareness of Latino civil rights struggles in America. Using state and federal cases as well as the stories of Latino 'heroes' who struggled to be treated equally in the workplace, in the classroom, in the courts and at the polls, the unit focuses on some of the forgotten people whose efforts have contributed to the growth of the United States. The unit will use events in the lives of Puerto Ricans and Mexican Americans from the signing of the *Treaty of Guadalupe Hidalgo* to the end of the twentieth century to investigate widespread discrimination and unfair practices against Latinos in America. In addition, given the current 2006 debates in Congress over immigration and naturalization rights and restrictions, the unit introduces a deeper background and understanding of Latino immigration and settlement patterns, traditions, and value systems as well as a consideration of the political struggles Latinos have faced over the course of American history.

(Developed for American History Survey, grade 8; recommended for American History, grades 8-10)

### **06.02.05**

#### **Breaking Bread — Building Bridges through the Art of Latino Cuisine, by Diane M. Nichols**

This is a unit on Latin American cuisine, with a particular focus on Mexican and Puerto Rican cuisine. I wrote this unit as a starting point to introduce my students to many other Latin American cultural themes. Young adolescents have a fascination with everything related to themselves, as well as food. I hope to hook my students' natural interest in this topic and then move on to such topics as immigration and the role of the Spanish language in America.

I focus on Mexican and Puerto Rican cuisine because a high percentage of my school's Latino student population is of Mexican or Puerto Rican descent. I have chosen two important staple foods from Latin America: corn and chocolate. It is my hope that my students will understand there is a lot more to Latin American cuisine than what they see at the fast food chains. When people come together to the table to "break bread," barriers begin to fall. My intention is to break down barriers and build an understanding as well as an appreciation of the Latino culture. This unit was designed for my level I Spanish classes. I teach Spanish IA to seventh graders and IB to eighth graders. In middle or grammar school, level I is divided into two years. It is the equivalent of year one in high school. It is recommended for beginning Spanish students level I; however, it can be adapted to any discipline that would like to promote a cultural understanding of the Latino culture and their communities.

(Developed for Spanish I, grade 8; recommended for Spanish I, Latino Cultures and Communities, grades 1-9)

### **06.02.06**

#### **Se Habla Español (También se Canta, se Baila, y se Escribe), by Alexandra J. Reyes**

Because it is sometimes difficult to pique students' curiosity and create excitement about a given topic, lessons need to be very interactive and engaging.

Music is an excellent way to reach others, regardless of the language. Music can also provide opportunities to learn vocabulary and grammar.

I have designed this unit to use with my seventh- and eighth-grade classes (Spanish I). While the language focus is rather simple (present tense, general vocabulary), this unit may be adjusted to suit different students' needs. My students love music, and I know they will be excited to discover the connections between different cultures and languages through this medium.

Latinos now comprise the largest minority population in the United States.

The music of the U.S. has not remained unaffected by the diversity of the American population, and has in many cases been irreversibly changed by it. I plan to integrate both Latino and Latino-influenced music into this unit in order to demonstrate the power of language to my students, and to relate the history and diversity of the Spanish-speaking world to them. My students will have a view of Latinos that is relevant, and will help them seek out comparisons and connections between other peoples and themselves.

(Developed for Spanish I, grades 7-8; recommended for Spanish, all grades)

### **06.02.07**

#### **Latino Visions: A Cultural Springboard for Reading, by Diane M. Huot**

This is a ten-day unit of study for children in grade three. The main goal of this unit is to summarize books with Latino themes, making it available on a regular basis to students learning to read. My goal will focus on three points. The first is to choose literature in which Latino children can identify with the characters and situations. The second is to emphasize similarities and differences across cultures, helping all students to understand diverse cultures and gain a greater understanding of each other. The third is to use this culturally rich literature to explicitly teach guided reading.

Using Latino literature, I hope to improve the students' critical steps in developing comprehension when forming a general understanding, developing interpretation, making connections, and demonstrating a critical stance. I hope to construct meaning, to self-regulate learning and to entertain. The unit will improve students' performance on the Connecticut Mastery Test in reading by providing opportunities for the student to notice predictability of the text, compare the characters and setting, notice the similarity of the structure, and make comparisons between texts.

(Developed for Reading, grade 2; recommended for Reading, grades 2-4)

### **06.02.08**

#### **Listen to the Rhythm, by Waltrina Kirkland-Mullins**

The rhythm of the *dunno*, *tamale*, *sakara*, *omele*, and *djembe* reverberate on Ghanaian, Nigerian, Senegalese, and Congolese shores. Their drum rhythms past and present have traveled over the Atlantic reaching Caribbean shores, among them the nations of Cuba and Puerto Rico. *Timbales*. *Bongo*. *Conga*. Their syncopated pulse weaves a story of past and present, beckoning listeners to investigate the common rhythm that resounds across oceans blue, uniting people of diverse cultures.

This unit serves as an ethno-musicological adventure, taking young learners on an up-close, historical look at the interconnectedness of West African, Puerto Rican, and Cuban cultures by way of the rhythm of the drum. Targeted at students in grades two and three (and modifiable to all grade levels) students will perceive that the drum and its various rhythms serve(d) as a source of communication, a "telephone" used to convey cultural mores, societal views, and the history of a people. The unit reinforces that despite the dehumanizing

institution of chattel slavery, the drumming tradition brought to Caribbean shores via the Middle Passage is reflective of survival coupled with a rich heritage of diverse people. The unit heralds one of many common threads that exist between African, Puerto Rican, and Cuban cultures.

Information contained herein aligns with New Haven Public School curriculum unit Standards, i.e., Language Arts/Writing Content Standard 2.0; SSCPS (students will demonstrate their understanding through written, verbal, visual, musical and/or technological formats and will pre-edit, draft, revise, edit and publish/showcase one or more final literary products); and SSCS 3.0 (using maps, globes, and related resources, students will identify different parts of the world and examine the traditions found therein).

(Developed for Language Arts, Social Studies, and Social Development, grades 2-3)

### **06.02.09**

#### **Latino Culture in My Life: A Closer Look at Latino Families and their Traditions, Holidays, and Celebrations, by Shannon E. Oneto**

The United States is now a place where hundreds of different cultures, religions, and races are represented, and we see that every day. Unfortunately, we all too often see and feel the repercussions from people who have not been taught to appreciate and embrace the things that make us unique. Children then, must be taught at a very early age to accept all people, learn more about other cultures, and share their own culture as well.

This unit, created for a mixed group of second language learners, will strive to begin to do just that. Latino students will be given opportunities to examine their own culture closely by discussing the holidays and celebrations that they participate in. They will also be working with their families to discover what it is that makes their family unique, and also, what similarities they share with other classmates. Students will become more familiar with Latino holidays (Day of the Dead, Christmas, Three Kings' Day, Easter, Cinco de Mayo, and Puerto Rican Day) through literature, food, crafts, singing, and dancing. Although this unit has students taking a closer look at themselves, there will be several opportunities for sharing, comparing, and recognizing the ties that connect many of us together.

Students will also practice their English oral language skills and increase their confidence when speaking the language.

(Developed for ESL/Social Studies, grade 1; recommended for ESL/Social Studies, grades K-2)



## **06.02.10**

### **Esperanza Rising: Connecting Latino Students to Literature, by Cortney R. Costa**

This unit is written for fourth, fifth, or even sixth graders. The unit revolves around a book called *Esperanza Rising* by Pam Muñoz Ryan. This story is based around a Mexican family, and can allow great connections for all students, Latinos in particular. This story can be used for a variety of readers, depending on how the unit is implemented. It is ideal for shared reading, or guided reading lessons. The plan for the book includes vocabulary, Spanish phrases, and reading comprehension questions. Each question is labeled with the proper Connecticut Mastery Test (CMT) strand, and is geared to familiarize the students with the format and acceptable responses to these questions.

Along with the lessons based solely on the book, there are lessons that will connect the students' emotions to the emotions of the characters. The students will track the journey of the characters in the story as well as the journeys of their own families. They will also be required to have conversations with their families about migration and moving, and will create a family history book at the culmination of this unit.

By the end of this unit, students should have a better understanding of what migration is and how it can change a family. Along with this knowledge, the students will be learning vocabulary pertinent to a Mexican migrant family, and California field workers. The students will also be highly focused on mastering comprehension of text as well as the completion of CMT questions.

(Developed for Literacy, grade 4; recommended for Literacy and Latino Studies, grades 4-6)

### *III. Postwar America: 1945-1963*

#### **Introduction**

The period in American history just after World War II was somewhat overlooked by historians for many years as they focused on the more obviously tumultuous decade of the 1960s. Yet in retrospect we can see that many of the social developments that peaked in the 1960s actually had their roots in the 1950s. Our image of the decade of the 1950s has long been shaped by an image of middle-class family togetherness and conformity through popular television shows like "Leave It to Beaver" and "Ozzie and Harriet." This image is not entirely false. In the period immediately after the war suburbs were created all over the land, and returning veterans and their wives, with help from the federal government through easy financing, flocked to them to begin their new lives as suburban dwellers. The economy soared, in part through the purchase of consumer durables to fill these new homes. Babies were born in record numbers, a further stimulus to the economy. One historian has referred to the period as American High.

Yet surface harmony and good times are not the whole story. Beneath the surface social currents swirled. America had to discover the great racial divide, brought to light in the landmark Supreme Court decision *Brown vs. Board of Education of Topeka*. African Americans had by no means been complacent about their place in the social fabric, but now they began to organize in protest. Led by the charismatic leader Dr. Martin Luther King, they boycotted the bus system in Montgomery, Alabama, sat in at lunch counters elsewhere, and by the early 1960s had developed as a powerful force for change. It is arguable that the rise of the civil rights movement was the best thing to come out of the 1950s.

Other groups too began to chafe against the constraints of the decade. Young people listened to the voice of Beat writers like Allen Ginsberg and Jack Kerouac and decided that their own lives as the children of the middle class were boring and lackluster. The Beat movement proclaimed that material goods could be set aside in the search for authenticity and what Kerouac referred to as "IT," thus laying the groundwork for the counterculture that emerged to the consternation of parents in the 1960s. And women in their suburban homes began to feel that discontent that Betty Friedan was to document in her groundbreaking study *The Feminine Mystique*. One unit in this seminar, by Joanne Pompano, examines the very early beginnings of the disability rights movement, galvanized by the return of veterans with disabling war wounds from World War II.

If Americans turned inward to domestic pleasures the retreat from the international scene is understandable in light of the virulence of the Cold War during these years. At home the repercussions of the Cold War were felt in a fear of subversion that led to the movement we call McCarthyism after its most notorious prosecutor, Senator Joseph McCarthy. We now know that Soviet spies were indeed at work in this country, but McCarthy went far beyond any evidence to charge hundreds of people, almost all entirely innocent, with subversion. He managed to poison the political atmosphere for years to come.

Perhaps the most overarching unit to emerge from this seminar is one by Mary Lou Narowski. Impressed by the lessons and tools students can learn from newspaper work, she created a unit that will call on each of the students in her classroom to choose one year from the decade of the 1950s and develop for that year a complete newspaper with as many of the features of a regular newspaper as possible.

Teachers in this seminar not surprisingly found their richest source in the civil rights movement. Lucia Rafala began her unit in the time of slavery and moved forward to the 1960s on what she called "The Road to Equality." Kevin Inge focused on the work of Dr. Martin Luther King, emphasizing the ways in which his life and work can teach students important lessons in leadership.

Joseph Corsetti took as his topic "McCarthy v. Murrow," with the intent to challenge his students to think about different political systems and their consequences, and to evaluate, through a mock trial, the evidence McCarthy presented to support his charges. Ascertaining truth also absorbed two other units, one by David Reynolds examining the work of the so-called "New Journalists" of the 1960s and the other by Crecia Swaim, looking at the work of the documentary photographer Dorothea Lange to consider whether photography is the perfect record of reality that is sometimes claimed.

Christine Elmore elected to focus on three individuals of the period whom she sees as agents of change — Elvis Presley, who turned the music industry on its ear with his new sound, Malcolm X, who challenged white America to live up to its promises and threatened militance if necessary, and Rachel Carson whose seminal work *Silent Spring* inaugurated the environmental movement.

Sean Griffin and Kristen Grandfield both took aspects of writing as the subject of their units. Sean Griffin, recognizing the attraction of fast-paced and active reading to win his students over to poetry, planned a unit that will introduce them to some of the protest poetry of the 1950s and 1960s and then ask them to participate in a poetry slam as a final project.

Kristen Grandfield looked to ancient Greek rhetoric for inspiration to coach her students in persuasive writing, using as models famous speeches of the 1950s and 1960s.

Taken together, these units bring to life a period in American history still alive in the memories of students' grandparents, but almost completely unknown to today's elementary and high school students.

Cynthia E. Russett

## Synopses of the Curriculum Units

### 06.03.01

#### **McCarthy v. Murrow: The Public Battle that Defined America's New Self in the Aftermath of World War II, by Joseph A. Corsetti**

By the end of the 1940s the United States had entered the Cold War, a conflict that would endure for the second half of the century. Out of this conflict would emerge perhaps one of the greatest threats to our democratic way of life: communism. More than just ideologically different, communism would change our perception of right and wrong, of moral and immoral, and of friend and foe. On the home front, and equally important battleground in the Cold War, a fierce battle would ensue; a veritable witch-hunt disguised amid patriotism. McCarthy would bring to the nation a stand on communism that could hardly be ignored, charges that required attention. In his public speeches McCarthy was the voice of a movement. McCarthy would define the role government would play in battling communism on domestic soil. In opposition to McCarthy stood Edward R. Murrow, who dared to attack the public giant via the airwaves and risked his own stature as a respected journalist. This battle that would take place via the airwaves would be instrumental in defining what America ought to be. Furthermore, the standards of journalism created by Murrow would help to define the role of television and the media as a source of information.

This unit will focus on a few historical topics linked to this final battle on television, the end product being an indictment hearing of Senator Joseph McCarthy on charges of inciting unnecessary fear and riotous behavior in the United States. The trial is designed to have students wrestle with complex ideas and to have them use, interpret and analyze primary source documents as evidence to support their arguments.

(Developed for U. S. History II, grade 11; recommended for U. S. History II, grade 11)

### 06.03.02

#### **Biographies for Change in a Time of Conformity, by Christine Elmore**

During the 1950s in America, conformity to group norms was the common behavior of the majority of people, both young and old, as they settled back into their traditional roles with the ending of World War II. Not everyone, however, chose to conform to the cultural norms, and the postwar era in America also became a time for sowing the seeds of great, even revolutionary social change. In my curriculum unit, I plan to focus on three particular social movements that drastically changed America's perspectives on music, on civil rights, and on the environment. Each movement has its human catalysts, without whom the great momentum may well have eventually dissipated. These seminal figures — Elvis Presley, Malcolm X, and Rachel Carson — were children of their times and so, in an effort to better understand postwar America, we should not refer only to history textbooks, but also to biographies that can 'flesh out' the times with more personal, human events.

Biography is like a versatile lens by which we can examine in detail a human being's life. But it can also be used to focus on the world in which that person lived. The reader comes away not only knowing about the person's life, but also about the social, economic and political fabric of the time.

The focus in my curriculum unit will be on *literacy*, both reading and writing. A number of the fourth generation CMT objectives will be our reading comprehension focus as students read, discuss, and write in their 'response journals.'

The lessons in this unit will be introduced three to four times a week for a period of 45-60 minutes over a three-month period.

(Developed for Language Arts, grade 4; recommended for Language Arts and Social Studies, grades 4-6)

### **06.03.03**

#### **Persuasively Speaking: Teaching Persuasive Writing through Great American Speeches, by Kristen J. Grandfield**

This is a curriculum unit designed for high school students to read, write and analyze persuasive writing techniques and rhetorical vocabulary. Persuasive writing is a must in high school classrooms with the inception of so many assessments asking students to write persuasive pieces. Knowing how to use the techniques of persuasive writing as well as recognizing logical and illogical fallacies, students can improve their writing.

This unit uses the speeches of Dwight Eisenhower, Martin Luther King, John F. Kennedy, Richard Nixon and William Faulkner as well as a variety of essays from college level composition books. Choosing speeches from the 1950s and 1960s serves dual purposes; one, it gives students a glimpse into American history and two, it allows students to really look at speeches that teachers and other academics reference so often. The goal of this unit is to give students a variety of opportunities to view others' persuasive writing and use that as a model to write a persuasive, position piece of their own.

(Developed for English III, grade 11; recommended for Junior English III, Senior English IV, and Writing Courses, grades 11-12)

### **06.03.04**

#### **Voices of the Sixties and the Modern Poetry Slam, by Sean Griffin**

In this unit I tried to help students to make a cultural connection between the music that they enjoy today and the poetry and music that was enjoyed by their parents and grandparents. The unit begins with a focus on the Beatnik poets of the fifties. I ask students to examine the poetry of Ginsberg, Ferlinghetti and others before giving them the chance to write their own beat poems and create artwork to accompany them. The second part of the unit focuses on the lyrics connected with the protest music of the

sixties. After providing the students with some background, I ask them to examine the lyrics, listen to the music and eventually create their own work similar to that which they studied. Finally in the final section of the unit, students examine spoken word or performance poetry.

The culminating project for the final section is a classroom poetry slam in which students share their work in a competitive manner.

(Developed for Language Arts, grade 8; recommended for English and Social Studies, grades 7-12)

### **06.03.05**

#### **Postwar America: King and the Civil Rights Movement, by Kevin P. Inge**

This is a thematic unit that will give students knowledge of the work and character of King's mission. The featured book for this unit is *Dr. Martin Luther King Jr., On Leadership*. I find this book to be instrumental in developing moral character and leadership skills within our youth.

Students will complete lessons in social development, social studies, language arts, math, art, public speaking, and drama. The duration of this unit will be approximately 15 class periods. This thematic unit was designed for students in grades five through eight. You can adjust the lessons to the specific needs of your students. It is teacher friendly and should be a pleasure to teach. I hope you find this unit informative and enjoyable for your classroom!

(Developed for Language Arts, grades 6-7; recommended for Social Studies, Language Arts, and Social Development, grades 5-8)

### **06.03.06**

#### **Tapestry: Weaving Language Arts and Social Studies into a Cohesive Whole, by Mary Lou Narowski**

Using postwar America 1945-1965 and the newspaper as a backdrop, this middle school unit weaves not only language arts and social studies together but also technology and the arts. Students will develop writing skills for a variety of expository situations related to the newspaper and also begin a dialogue on important issues dealing with social and political changes from 1945 to the present. Understanding how a wartime climate led to one of seeking individual prosperity, how the civil rights movement took hold and gained momentum, how women became discontented and sought refuge in the workplace, how the cold war with Russia spurred on technological advances, how music went from the Andrew Sisters to rock and roll, to the Beatles and now to rap and hip hop, will hopefully begin a discussion that will lead students to search for more information thus improving not only their literacy and writing skills but also their understanding of important historical issues that shaped our world.

Using information found in a variety of sources, students will create a special edition newspaper entitled, "The Year in Review, 19\_". Their finished newspaper will contain international, national, and local news, an editorial page, relevant pictures, obituaries, weather, horoscopes, comics, sports, advertisements, classifieds, a book review, special interest section, and financial section.

(Recommended for English and Social Studies, grades 7-12.)

### **06.03.07**

#### **The Path to Opportunity: A Study of Disability Rights in Postwar America, by Joanne R. Pompano**

This curriculum unit explores the development of the Disability Rights Movement in postwar America. This unit aids students in understanding the political, legal and social activism that fueled this movement and allows students to examine the many stages and major events encountered by participants fighting for the rights of people with disabilities. It provides a short history of how society has treated individuals with disabilities. However, the focus of the curriculum deals with the milestones beginning with the influx of disabled veterans coming home from World War II to the passage of the landmark Americans with Disabilities Act in 1990.

This curriculum unit was developed for blind and visually impaired students in grades 9-12. However, it is a topic that will be useful for students with any disability as well as non-disabled students who wish to gain insight into the problems faced by students with disabilities.

(Developed for "Life Skill for Blind and Partially Sighted" Special Education, grades 9-12; recommended for "Life Skill for Blind and Partially Sighted" Special Education, grades 9-12)

### **06.03.08**

#### **The Road to Equality, by Lucia Rafala**

Traditionally in our public schools, we celebrate African American history during the months of January and February. We commence this celebration with the birthday of Dr. Martin Luther King, Jr. and continue the celebration by highlighting various other great African Americans. This unit of instruction is intended to provide a consistent educational framework for the study of African American history in the elementary schools that is consistent with the Keys to Comprehension, writing standards, technology standards, and library media standards of the New Haven Public Schools. By providing such a framework, this unit enables teachers to provide a quality unit of instruction that supports the current standards-based curricula in addition to providing students with a rich historical perspective of the evolution of equality for African Americans.

The unit is written specifically for students in the second and third grades. However, there are additional activities and strategies for those students who

academically function below or above the second and third grades. This information will enable teachers to plan differentiated lessons that address all ability levels and learning styles. In addition, the adaptation of this unit to include other elementary classes such as first grade or fourth grade would not be difficult. The range of literature and topics selected would support applications in any level classroom through collaboration with the library media specialist.

(Developed for History and Literacy, grades 2-3; recommended for History, grades 1-4)

### **06.03.09**

#### **New Journalism — Narrowing the Gap between Fact and Fiction, by David Reynolds**

Students enjoy real events, with real characters, in real situations; just as American television today is ruled by reality TV: American Idol, The Real World, Project Runway, America's Next Top Model, and Survivor to name a few. What set the precedent for today's "reality" showcase was New Journalism.

This unit explores the work of 1960s authors who combined the techniques of journalism with the narrative voice of novels. Primarily through the use of *In Cold Blood* by Truman Capote and *The Things They Carried* by Tim O'Brien, students will explore subjectivity, bias, the impact of New Journalism on history, and New Journalism's impact on literature. This unit proposes nine lessons that will ultimately have students questioning their perceptions and what they believe to be the "truth."

(Developed for English II and American Literature, grade 10; recommended for English, American Literature, 20th Century American History, grades 10-12)

### **06.03.10**

#### **Dorothea Lange and Documentary Modes of Expression, by Crecia C. Swaim**

This is an eighth grade social studies unit that develops and expands language arts skills assessed on the Connecticut Mastery Test. This will be done in the context of the life and work of photographer Dorothea Lange. After introducing Dorothea Lange as a person, focusing on her childhood and early career as a point of reference with which students may identify, we will use her photography as a spring-board for content, reflection, and analysis. Students will use these resources to practice the CMT skills of forming a general understanding, developing interpretation, making reader/text connections, and examining content and structure.

We will explore the craft of documentary photography, including the questions that cropping and posing raise in the debate over whether or not a photograph reflects a truthful reality, as well as the idea of social responsibility and the power of documentary photography to effect social change.

I want students to understand the importance of documenting life as it happens, of



creating a record that represents multiple voices. The next part of the unit will set the students to the task of exploring their own voices as they relate to the world around them. The unit will culminate with students choosing their preferred artistic mode of expression to create an original documentary work. Students will summarize and explain the meaning of their piece, and will write a persuasive letter to someone they think needs persuading on the issue.

This unit is meant to augment standard required social studies curriculum addressing the Great Depression and World War II.

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

## *IV. Math in the Beauty and Realization of Architecture*

### **Introduction**

Architecture is a profession where the arts and sciences fuse together to create environments beneficial for human habitation. Earth's natural resources create the basis for people to discover what to use and how to use it for adaptation to create environments. Human senses readily assess the aesthetic and pragmatic processes for sorting out what to use, when, and how much is required to achieve the goal. The processes for designing and constructing objects, buildings, or environments challenge not rigid but broad inclusiveness of applied knowledge that inherently involves many varied applications of mathematics.

Beauty rises from the embrace of the visual delight, the perfection of function, and the efficiency of operation that captures a wholeness for the intended purpose. Many tools used in the process are vital to the success of developing the things and environments people use. As an example, the elegance of a great tree symbolizes nature's illustration of the breadth and wholeness of beauty, strength and durability. A tree in the landscape demonstrates the simple lever principle and shows us many limits and variations for applications. Using those same principles we can experiment with design, with material, and with construction methods so that even the design process creates an authentic aura of beauty when good solutions are achieved.

Our natural environment not only provides the materials for our projects, it also provides the sources for variations of structural geometries, of light, of thermal, of olfactory, of audio, of tactile, of air flow, and of material durability. Learning about these factors, together with establishing relationships of one to another, reflects the enrichment we experience from living in the world that surrounds us on a daily basis. Although such a vast knowledge base enables rational design, developing the ability to observe and learn from these sources can be exciting for the beginning learner to discover, and for the experienced learner to share the exhilaration of continuous learning.

The physical and mechanical properties of each material form its unique identity. That data is used to assess the opportunities and limits of that material when used to design an object. How material pieces are formed, cut, molded and connected provides the designer with critical information. The size, strength, stability, and durability of each architectonic piece depend on the translation of basic data into realistic form and performance requirements. Also, form givers depend on a subjective sense of artistic relationships. Movement, rhythm, repetition, vibration all emerge from the material, the relationships, and the connectivity of abstract ideas to real objects. Even music is composed with beauty firmly anchored in human understanding of composition and applied mathematics.

Historical precedents exist as illustrations of thoughtful achievements to learn about successes and failures in our built environment. Historical, and cultural, examples inform our design processes and spurs us to value our precedents as we seek new forms, new materials and new applications.

This seminar focused on architecture as a broad basis to explore the teaching of mathematics. The inclusion of a project to design and construct a model provided an opportunity to experience how making things, individually created, implants a unique learning method.

Curriculum units included a wide palette of topics such as Roman aqueducts, bridges, cultures, music, geometric forms, and housing, each with a wide range of mathematical applications suitable for the kindergartner as well as for the advanced twelfth grade level. With opportunities for students to observe, analyze, design and construct projects the inclusive activities for these units offer learning opportunities beyond the classroom. The curriculum units created for this seminar recognize the importance of the talents and interests of individual students as they learn about principles of life through the focus on applied mathematics in architecture.

Martin D. Gehner

## **Synopses of the Curriculum Units**

### **06.04.01**

#### **Gingerbread Architecture: An Exploration of Architecture and Engineering, by Jennifer Esty**

In this unit students will combine math, technology and art in the creation of gingerbread houses. Students will use math and basic engineering skills to test various gingerbread house building materials for strength and other important building characteristics. Students will also study various building techniques and the materials to which they have been applied throughout human history. Using information gained from these two exercises, students will design and construct gingerbread houses.

This unit will be very good for a class with many different types of learners. It will have strong visual elements to it, but it will also have a very kinesthetic aspect to it as well as spatial and mathematical elements. Because of the many skills required, this unit will lend itself well to a class that can work in small teams. All of the projects involved in this curriculum unit could be accomplished by individuals, but most of them could also be done in small groups or teams.

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

### **06.04.02**

#### **Math, Music, and Architecture: Kindergarten Geometry and Aesthetics in Music and Architecture, by Sunny Jonas**

This unit reflects the world in which our students live — a world of connections and meaningful engagement that does not operate within tight confines of disciplinary boundaries. Utilizing the five senses: playing instruments that are analogous to mathematical principles in architecture (tactile, auditory), presenting images that elicit writing, musical composition (visual), and having experiences that involve smells and tastes, elicits critical thinking and dialogue in our explorations within the unit. In other words, this curriculum will enable students to engage their senses, our vision in the aesthetics of architecture, and hearing in musical listening and composition especially, to promote writing, reading, mathematics, composition, and conversation. The unit includes a field trip to Yale, counting shapes and colors in rose windows, listening to and counting the number of cymbal crashes in music, and other lessons that activate and build upon schema (students' prior knowledge). Finding these interdisciplinary connections within a culture and/or time period is an authentic way to explore the relationships that architecture, mathematics, and music have with each other.

(Developed for Mathematics, grade K; recommended for Music and Mathematics, grade K)

### **06.04.03**

#### **Mathematics Alive: Environment and Design of Human Habitats, by Pedro Mendia-Landa**

How can architectural mathematical concepts be integrated into everyday life applications? What are the basic principles and relationships between mathematics and architectural design? What are the direct and indirect impacts of architectural form and design in our lives? And more importantly, how can these concepts be presented to elementary school students in a meaningful way? These are some of the central questions that this curricular unit begins to answer and attempts to clarify.

In this unit, the architectural mathematical concepts are integrated into daily life applications by helping students observe the environment around them as critical observers, by paying attention to details that can then be quantified, tabulated, measured, graphed, and analyzed, and by allowing students to see the various relationships between the design and application of mathematical concepts of measurement, arithmetic, and geometry in the completion of a structure.

A list of student, teacher, and electronic resources, evaluation rubrics, extension activities and standards is provided for the implementation of the unit.

(Developed for Integrated Language Arts, Mathematics, Social Studies, and Art, grade 3; recommended for Language Arts, Mathematics, Social Studies, Science, and Art, grades 2-4)

### **06.04.04**

#### **Aqueduct Architecture: Moving Water to the Masses in Ancient Rome, by Ralph E. Russo**

This unit seeks to raise awareness of basic, yet, historic principles of architecture as they apply to the provision of water to an urban center. As is fitting with ninth grade world civilizations curriculum, the architecture of a Roman aqueduct is the focal point of this study. Studying aqueduct architecture encourages proficiency in quantitative skills, language arts, and organizational skills. Quantitative activities such as measuring, using scale, and calculating volume facilitate developing math skills. Critical reading of primary and secondary sources, document based questions, discussion and writing descriptively and persuasively teach and/or reinforce language arts skills. Readings also address the levels of organization or government necessary to design, build, and maintain an aqueduct. Statistical information from the United Nations' 2003 campaign on the International Year of Freshwater is included to highlight the major challenges to providing clean water to urban centers which account for almost half the world's population. Activities for having students explore how their community provides water are included. In short, the unit can be used as an interdisciplinary unit with the support of a math teacher or as a component of the study of classical civilizations. Reference to local, state, and national standards is included.

Water is an essential resource for health and survival. We are as dependent on having clean water as the Romans were 2000 years ago. Growing demands on our water supply challenge us to be conscious of how we consume water and ensure a healthy standard of water quality. Because we face some of the same challenges to providing clean water to our cities as did the Romans, having students make connections to how we provide clean water to our urban centers makes sense.

(Developed for World Civilizations, grade 9; recommended for World Civilizations, grades 9-12)

#### **06.04.05**

#### **Less is More: Realizing Mathematics through Architecture, by Kenneth William Spinka**

The purpose of this unit is to introduce and integrate architecture as a study subject in the math curriculum for high school grade levels within the New Haven Public School system. This proposal cites specific goals and objectives that will enable students to respond to a series of sequential assignments, culminating and terminating in one or more definitions of a geodesic dome and its components. Unlike the architectural construction of a traditional dome, which has a very long and robust history, geodesic domes are relatively new. The first geodesic dome was built by Dr. Walter Bauersfeld in 1922, followed by Buckminster Fuller who obtained his first patent for geodesic domes in 1951 (see patent number 2,682,235). While geodesic domes make excellent buildings, their characteristics rely upon numerous mathematical definitions. Also, while they are inexpensive, strong, easy to assemble and easy to tear down, they can also be built at one site and transported elsewhere. These domes can provide temporary and/or emergency shelters as well as permanently-stable, long-term buildings.

The characteristics of geodesic domes are also well-suited for outer space, beyond this atmosphere, on other planets, or leagues beneath the sea. Perhaps geodesic domes will be manufactured on an assembly-line like airplanes or automobiles; and in sufficient numbers so that everyone in the world could afford a geodesic dome for a home. At present, this unit addresses and presents the mathematical concepts and definitions that are geodesic-implicit. The lesson plans identify: goals; objectives; vocabulary; and assessments recommended for Mathematics, grades 9-12.

(Developed for Mathematics, grades 9-12; recommended for Mathematics, Algebra, Geometry, Trigonometry, Calculus, grades 9-12)

#### **06.04.06**

#### **The Math in the Design and Building of Bridges, by Donna Levandoski Wade**

What would our world be like without bridges? There are over half a million bridges in our country alone. Do you know how they work? Why are some curved while others are not? Some are delicate, ingenious and innovative while others are sturdy, functional and

dull. Each is the result of centuries of creative design, constant technological development and of imagination held in check by the need for safety, reliability and peer approval. Every bridge grows out of people's needs. The story of bridges is a story of materials. Engineers must consider many things before determining the size, shape and overall look of a bridge. The next time you see a bridge after completing this unit, you will see it with a fresh sense of understanding and a greater level of appreciation of all that went into its construction. Engineering is an art as well as a science.

These lessons will enable the students to learn the history of bridges, identify the basic types of bridges, understand bridge vocabulary, determine the most appropriate type bridge for a specific area based on factors like cost, climate, and function, research. Then students will apply information on the Internet, understand the construction, explain the forces of compression and tension, use model software to discover the physics in bridge building, create scale drawings, measure and compute math problems accurately, build a model bridge to test load bearing and design a community bridge that will inspire hope and friendship.

This unit is written for grades eight and up, average math students. The students in New Haven are from a wide variety of backgrounds. Their mathematical skills are often below grade level and their interest in school and math is often low. There is a pressing need to improve academic performance, proficiency on the CAPT test, and high school completion rates. The development and use of a curriculum that focuses on the application of math and problem solving on real life problems in the building of bridges should help inspire and motivate learning.

The unit will begin with the history of bridges, discuss some famous bridges, disasters and bridge facts, explain the basic types of bridges, bridge parts, explore the basic forces at work, truss designs, research and experience the multitude of designs, materials and constructions, find and graph information on bridges, and draw a blueprint. It will conclude with the students designing a bridge for their community that will bridge diversity and promote understanding and community.

(Developed for Algebra I, grades 9-12; recommended for Pre-Algebra, grades 7-8, and Algebra I, grades 7-12)

## ***V. Engineering in Modern Medicine***

### **Introduction**

The practice of medicine has changed dramatically since you were born. Consider a few of these changes, some of which have undoubtedly affected your own life: couples can test for pregnancy in their homes, a new vaccine is available for chicken pox, ultrasound imaging is available to follow the progress of pregnancy, and small reliable pumps can administer insulin continuously for diabetics. For your parents, the changes have been even more sweeping.

Overall life expectancy (that is, the span of years that people born in a given year are expected to live) increased from 50 in 1900 to almost 80 by 2000. You can expect to live 30 years longer than your great-grandparents; you can also expect to be healthier and more active during all the years of your life.

How has this happened? One answer is obvious. People are living longer because they are not dying in situations that were previously fatal, such as childbirth and bacterial infections. The growth of biomedical engineering is a major factor in this extension of life and improvement of health. Biomedical engineers have contributed to every field of medicine — from radiology to obstetrics to cancer treatment to emergency medicine. In this seminar, we investigated some of the biomedical engineering innovations that have improved patient care. We looked at the science underlying these innovations, the design of medical devices, and (in some cases) the mathematics that governs the principles of their operations.

Our work in this seminar followed a syllabus that allowed us to examine many of the activities that encompass modern biomedical engineering. The first part of the seminar focused on technologies that have enabled biomedical engineering to enter the modern era: recombinant DNA technology, cell culture technology, and antibody technology. These topics led naturally to a discussion on vaccine development. We spent two weeks discussing drug delivery systems, starting with the conventional forms of drug delivery, such as injections and pills, before expanding to consider new systems, such as drug-eluting stents and transdermal patches. With this information on drug delivery as background, we discussed the role of engineering in cancer treatment including imaging, radiation therapy, and chemotherapy. The final weeks of the seminar covered dialysis and other blood treatments, artificial organs, and bio-medical imaging.

The discussions were supplemented with drafts of chapters from a book in progress, *Biomedical Engineering: Bridging Medicine and Technology*, by myself and Veronique Tran. The textbook is scheduled for publication in 2007.

The Fellows prepared curriculum units that covered the breadth of biomedical engineering, although the collection focused primarily on the chemical and medicinal aspects of biomedical engineering.



Karen Beitler prepared a unit on "Launch Biotechnology in Your Classroom" for high school science students. Karen's unit explores fundamental principles that are important in biotechnology and biomedical engineering, focusing primarily on diffusion and its consequences in drug delivery. Her unit contains a wealth of background information on drug delivery systems that depend on diffusion for their operation. The lesson plans that Karen has designed will allow teachers and students to get hands-on experience with these concepts. She emphasizes activities that will help students develop an intuitive understanding of the role of physical phenomena, such as diffusion, in biotechnology applications.

Chrissy Bieler prepared a unit on "Dietary Supplements and the Chemistry of Life" for high school chemistry students. Her unit provides background information on the major components of the human diet and an introduction to metabolism. The unit focuses on the dietary supplements, particularly those that are marketed for use in weight reduction. This unit should be of great interest to high school students, who may be tempted to use these supplements and will benefit from Chrissy's clear description of the potential problems with these products.

The unit has lessons that describe metabolism, dietary and energy needs for children and young adults, and analysis of dietary supplements.

Raymond Brooks prepared a unit on "Biomedical Engineering and Quality of Life Improvements" for students in grades six through eight interested in science fair projects. In his unit, Ray provides an example of a natural experiment, which students can perform using existing information that is available in textbooks and Internet sources to test their own hypotheses about the role of technology on disease progression. Ray illustrates his approach with the example of treatments for prostate cancer. His unit progresses systematically from study of the cell and cell components through cancer and its treatment.

Matthew Cacopardo prepared a unit "Hold Off on the Headphones" for high school science students. Matt's project uses the auditory system as a platform to blend material from the physical and biological sciences into a coordinated unit. His unit progresses systematically from a description of waves and their properties, to sound and its measurement, to the biology of hearing loss. The unit should appeal to students, because it involves a subject of interest to many of them — sound and the experience of music. Matt incorporates creative hands-on activities to provide tangible experience upon which to build a conceptual understanding of far-reaching concepts in physics.

Judith Dixon prepared a unit on "A Child's Journey through Medicine" for fifth grade students. Judy's project focuses on human physiology, highlighting the respiratory and cardiovascular systems and the problems that occur in children with asthma. Her unit blends science background with practical knowledge that students should find interesting: many will have experience with asthma, or friends and classmates with asthma, and the unit provides an excellent connection for students between a problem they can see and the workings of their bodies. The unit introduces concepts of drug delivery, using medication

for asthma as an example. The lesson plan is a balanced mixture of activities, which are hands-on and participatory.

Carolyn Kinder prepared a unit on "Biomedical Engineering and Diabetes" for fifth to eighth grade science students. Carolyn's unit provides background on diabetes, focusing on the physiology of the disease, its effect on people who suffer from diabetes, and the tools that are available for treating it. Her unit is prepared for students who are at an age at which they will be recognizing diseases such as diabetes in friends and family; this unit provides teachers with tools for using that curiosity about disease to draw students into the underlying biology and the technology for treatment. There is an excellent section on vocabulary, a pre-test for assessing students' prior knowledge, and activities that can be used to draw students into discussions and learning about the disease and its treatment.

Marcela Oliveira-Antunovich prepared a unit on "Interdisciplinary Applications of Chemistry through Engineering: CSI New Haven" for high school chemistry students. Marcy recognizes the great interest of students in forensic science, and uses that interest to introduce chemical and engineering techniques important in that area. Her unit describes some of the chemical techniques that are routinely now in forensic science including chromatography, spectroscopy, pH determination, and DNA analysis. She develops a case study of an accident scene as the basis for lesson activities, which will allow students to get hands-on experience with chemical determinations.

Hermine Smikle prepared a unit on "Mathematics in Biomedical Engineering" for grade 11 and 12 mathematics students. Hermine recognizes the central role of mathematics in engineering, and introduces some of the techniques that can be used to understand biomedical engineering. Students often react more positively to mathematics that is connected to applications, and biomedical engineering provides a wealth of interesting examples. Hermine's examples are drawn from diverse areas, including cancer cell growth and drug delivery.

Chris Willems prepared a unit on "The Challenge to Deliver Insulin" for high school biology and chemistry students. Chris's unit, like Carolyn's, focuses on diabetes, but his unit concentrates on the chemistry of insulin, the methods of its production by the body, and the techniques that have been used to produce it for use as a drug. Because insulin is a protein, this provides Chris with an opportunity to explore the biochemistry of proteins and the molecular biology of insulin manufacture. Chris provides diverse connections — on insulin research, molecular evolution, and others — that teachers can follow in their classroom studies. His lesson plans also span a range from molecular models to planning for a healthy lifestyle.

W. Mark Saltzman

## **Synopses of the Curriculum Units**

### **06.05.01**

#### **Launch Biotechnology into Your Classroom: Drug Delivery and Diffusion, by Karen A. Beitler**

Biotechnology involves new methods to enhance the quality of life through tissue and cellular engineering; biomaterials and biological signal processing, imaging, instrumentation; biomechanics, integrative biology; transport phenomena, systems analysis and electrophysiology. These technologies provide new and exciting avenues for those with an interest in the medical field and technology. This unit will explore only one technology that is still in its infancy but has enormous potential for future generations. The field of transdermal delivery has opened the door to pain free delivery of medication that provides consistent, continuous release, bypasses the digestive system without injection and minimizes adverse side effects of medications. The unit is intended to enhance student understanding of how drugs are delivered to patients and the technology and responsibility that accompanies the development of these systems. The focus will be on biomedical technologies such as trans- dermal patches, drug delivering disks and angioplasty procedures that seek to maximize efficacy of the drug at the target cellular level and minimize side effects to other parts of the organism. Enormous exposure to biomedical technology is seen in the many new CSI programs on television and has brought biomedical techniques and biotechnology to the forefront of education. There are abundant careers in these fields and teachers need to expose students to these options as they prepare to choose schools for their future education. Careers in medicine no longer mean doc- tor, nurse and direct patient care; biotechnology has burst open the field with exciting career paths for those with a pioneer spirit and an innovative mind.

(Developed for Biology, grade 10; recommended for Biology, Technology, and Forensic Science, grades 9-12)

### **06.05.02**

#### **Dietary Supplements and the Chemistry of Life, by Chrissy Bieler**

This unit is designed for an eleventh grade chemistry curriculum. The goal of the unit is to provide students with background information on the molecules and compounds that make up both the human body and the foods and nutrients they provide to it. Students will use this background knowledge to gain a deeper understanding of bodily processes and functions, and ultimately study the effect of dietary supplements on these functions. The students will be able to apply this unit to their daily lives by gaining fundamental knowledge of carbohydrates, lipids, and proteins; the processes of anabolism and catabolism; the function and effect of ATP; caloric intake and total energy expenditure; and the definition and role of dietary supplements on their bodies. They will perform activities that will help them further grasp these concepts and that will allow them to relate this information directly to their own function as a human being.

It is important to educate students on these topics at an early age to prevent serious health

issues from plaguing them in the future. The dietary supplements that are focused on in this unit are those that have been advertised for weight loss purposes. While there are many that exist in this capacity, the intention of this unit is to focus on a small group of these supplements that have been made popular and caused much controversy in recent years. The overall goal is to make students aware of the effects of these types of dietary supplements and to research and suggest healthier alternatives to weight loss and body toning.

(Developed for Chemistry, grade 11; recommended for Chemistry, Biology, and Health, High School grades)

### **06.05.03**

#### **Biomedical Engineering and Quality of Life Improvements, by Raymond Brooks**

This unit is designed to help teachers and students in grades seven and eight to become familiar with observational or natural experiments. Many of our students have an interest in investigating topics that do not allow for the traditional manipulative experiment. To perform an observational or natural experiment, the student does systematic and experimental work using experiments and research that has been done by others. This unit gives suggestions for doing a health-related project.

Developing a hypothesis is the first step for the process. After their hypothesis has been approved by the teacher, students begin to gather information from several sources that may or may not support their hypothesis. The activity will be of value and interest to the student, as he/she will have an opportunity to investigate an illness or disease of interest. They may have a family member or a friend dealing with an illness and wish to become more knowledgeable on how biomedical engineering has improved their chances of living with or being cured of a particular disease.

The investigation should include the following:

- What is the name of your disease?
- What is your hypothesis?
- What are some causes of your disease?
- How widespread a problem is your disease?
- Is there a particular group more susceptible to this disease?
- Are there preventative measures that can be taken to lessen the impact or prevent this disease?
- How is the disease detected?
- What is the treatment(s) for this disease?
- What are the pros and cons of the treatment(s)?
- How has biomedical engineering helped in the treatment and/or prevention of this disease?

Following these suggestions should lead to a successful project.

(Developed for Science Fair Tutoring, grades 5-8; recommended for Science/Life, grades 7-8)

#### **06.05.04**

##### **Hold Off on the Headphones, by Matthew Cacopardo**

This unit deals with sound waves and their influence on our society and physiology. Its goal is to have students develop a scientific understanding of the properties of sound waves and how these properties when abused can lead to negative physiological changes in our ability to hear sounds. It is an interdisciplinary approach which utilizes the sciences, mathematics and the humanities. It begins by introducing the concept of a longitudinal sound wave. It briefly compares these waves to transverse waves but then delves deeper into the properties of sound waves. It describes how the human ear is able to pick up sound and carry the information back to the central nervous system. It examines the delicate structures of the inner ear's auditory cells, the destructive capabilities of abusing the properties of sound waves, and how this abuse can be detrimental to the survival of these cells and the quality of hearing ability. Students will read various articles on the effects of headphone use on the hearing of younger adults. Students will write a persuasive essay for or against extended iPod use. With this knowledge students will create an ad campaign for modern biomedical technology for improving hearing after damage is done.

(Developed for Biology, grade 10; recommended for Integrated Science, grade 9, and Conceptual Physics and Biology, grade 10)

#### **06.05.05**

##### **A Child's Journey through Medicine, by Judith Dixon**

Throughout history technology has made advances that have enhanced the quality of life for some humans, especially children. Many infectious diseases that once had a high mortality rate are now non-existent; for example, small pox, scarlet fever, and diphtheria. Today vaccines are used to prevent diseases.

Families until recently did not have nearly as routine access to doctors or medicine as they often have now in our society. Even with all of the technology available there is still a need to educate people on illnesses that affect us today. One of the most prevalent illnesses affecting millions of people is asthma. Five million children in the U.S. have asthma. The unit will discuss (a) what asthma is and who it affects, (b) discuss the drug delivery systems for treating asthma and (c) how asthma affects the respiratory/circulatory systems with the use of medicine.

(Developed for Life Science and Environmental Science, grade 5; recommended for Life Science and Environmental Science, grades 4-6, and School Health, grades 5-6)

### **06.05.06**

#### **Biomedical Engineering and Diabetes, by Carolyn N. Kinder**

Biomedical engineering is an umbrella of technologies that have joined together molecular and genomic medicine with engineering methods. Biomedical engineering can be both enhancing and complicating to human life. Many people are in need of the technology to help them manage serious and complicated diseases like diabetes. Although people need bioengineering technology, many people may not adopt some of the innovations to their lifestyle because issues arise, such as concern about having artificial parts in the body.

Diabetes is a disease that prevents the body from using the sugars and starches in food for energy. Diabetes is caused when the body does not make or cannot use insulin. This unit will focus on biomedical engineering and diabetes. The first part of the unit will discuss diabetes, its causes, and old and current technology to control the disease. The second part of the unit will discuss biomedical engineering and new technology to control the disease.

The unit will be designed for students in grades five to eight. It will include content, lesson plans, reading list, teacher resources and a bibliography. It is hoped that teachers will use this unit to make students aware: 1) Diabetes is a serious disease; 2) How to prevent it or make themselves less vulnerable to the disease; 3) How to control diabetes; and 4) What new innovative technologies are available for now and the future. This section of the unit will address what is diabetes, the types of diabetes, symptoms, how diabetes affects you, race factors and health factors.

(Developed for Science, grade 8; recommended for Science and Social Studies, grades 5-8)

### **06.05.07**

#### **Interdisciplinary Applications of Chemistry through Engineering in Modern Medicine: CSI New Haven, by Marcela A. Oliveira-Antunovich**

This unit has been designed with the focus of integrating scientific disciplines through the use of modern interests in forensic science. Even though the main focus is chemistry, the unit has been created so that inclusion of biology and physics concepts can be intertwined in order to provide students with a more concise understanding of the realm of forensic science and crime scene investigation.

The aim is to provide students with a scientific experience that is both educational and entertaining, through hands-on inquiry driven activities. The expectation of the unit is that students will be given the opportunity to understand forensic science, the laboratory environment, as well as the education requirements for forensic scientists.

At the initiation of this unit, the teacher should provide students with unique scenarios that contain alternate outcomes. By doing so, students will each be given unique

problems to solve and methods of analysis. The timeframe for this unit should be no less than 3 weeks so that both students and teachers gain the most in-depth applications of the topics at hand. In the last week, time should be allotted so that students present on their findings.

(Developed for Honors Chemistry and AP Chemistry, grades 10-12; recommended for High School Science courses, grades 10-12)

### **06.05.08**

#### **Mathematics in Bioengineering: Its Application for Today's Students, by Hermine Smikle**

What is Bioengineering? Bioengineering is engineering that is applied to human health. Because human health is concerned with different aspects of our bodies not just the physical aspects, biomedical engineers are concerned with all aspects and a wide range of problems that affect humans. As with the work of other engineers, the work of bio engineers is not always seen by the general public. The work of biomedical engineers — like that of social engineers, mechanical, structural engineers, and other types of engineers — is concerned with the improvement of conditions for the society. From the bioengineering point of view, the body is considered another system, therefore it needs to be maintained, to be analyzed if problems arise and parts replaced when broken.

This unit addresses drug delivery systems and the biocompatible materials used; how the drug delivery systems and the body interact; and the connections to the mathematics curriculum. This unit aims to present and explain the mathematical models that are used in the study of drug delivery systems. An attempt will be made to make the mathematical concepts applicable to both topics in the domain of both middle school and high school mathematics standards. This unit addresses the content standards that involve linear functions and graphs; exponential functions (used to describe growth and decay); area under the curve; proportion and proportional reasoning and its application; the concept of increase and decrease of volume with respect to time; and the application of graphs to show the concentration of drugs in the blood stream, and the increasing and decreasing quantities over time.

Included in this section will be sample problems that will provide examples necessary and written to provide practice in solving CAPT-type problems. These problems will be written so that they will employ mathematical strategies from algebra 1 through to calculus classes. Efforts will be made to provide a sample scenario that could be used for reading for interdisciplinary information for a high school science and or math class.

(Developed for AP Calculus, grades 11-12; recommended for Mathematics, grades 11-12)

## **06.05.09**

### **The Challenge to Deliver Insulin, by Chris Willems**

This curriculum unit is intended primarily for the high school biology and chemistry classroom. The focus is on chemistry and cellular functioning as it relates to diabetes.

Insulin assists the cellular uptake of glucose liberated during carbohydrate digestion and also regulates the storage of glucose as glycogen. Diabetes is a disease resulting from insufficient insulin production or destruction of the insulin by the immune system.

The development of recombinant human insulin in the 1980s has been a major improvement to the treatment of diabetes. The gene which produces insulin is located on chromosome 11 of humans and was successfully inserted into K-12 strain of *E. coli* bacteria. All animals use insulin, so why were pig and cow insulin used to supplement human insulin? Why not squirrel, elephant or starling insulin?

As a culminating activity for the unit, students are challenged to evaluate their risk of developing diabetes, based on current lifestyle choices. They also design a drug delivery system for insulin, or some other large polypeptide. They must consider cost, effectiveness, and patient comfort.

(Developed for Biology, grade 10; recommended for Biology, Chemistry, and Biotechnology, High School grades)



## *VI. Anatomy and Art: How We See and Understand*

### **Introduction**

This seminar was based on the assumption that the student's creation of art enriches his/her learning in the sciences. Much of the history of art is dominated by depictions of the human body. From the earliest caveman drawings to Da Vinci to the contemporary digital images of the Visible Human, there is a rich history of efforts to understand our own bodies through art. The use of art encourages tactile and visual learners to express themselves as well as develops spatial and artistic skills in students with other learning styles. The seminar was designed to appeal to teachers at all levels in subjects ranging from the health sciences, biology and psychology to art.

Topics in the seminar included:

1. How depiction of the human body has evolved through the ages and how the social, cultural and scientific environment has affected that depiction.
2. How schematic diagrams of the body may be used to clarify complexity.
3. How cross-sectional representations of the body are understood and how they can enhance our ability to see three-dimensionally.
4. How X-ray, CAT scans and MRIs are obtained and what they reveal about the structure and function of the body.

The variety of curriculum units developed in this seminar reflects the broad range of interests of the Fellows as well as the wide range of target populations. The first unit, developed by Wendy Decter, uses the compelling image of the Vitruvian Man by Da Vinci to "hook" her high school students on a multidisciplinary study of the proportions of the body. Alison Kennedy's unit uses art exercises to teach elementary students about their bodies and how health can be enhanced by making good decisions. Barbara Natale focuses on art projects that teach the skeletal system to fourth and fifth grade students. She ties one of her units to a school-wide celebration of the "Day of the Dead." Marisa Ferrarese's unit is the first of three that concentrate on the brain and the senses. Her unit uses examination of art and medical imaging to stimulate inquiry about the five senses. It is targeted to fifth grade students. Heidi Everett's unit examines the brain and senses at a level appropriate for high school students.

Her lessons are written to maximize the involvement of Gardner's multiple intelligences. Justin Boucher's unit is designed to introduce the connections of the brain in an AP psychology course. He uses schematic diagrams to simplify the complexity of the brain. These diagrams involve minimal artistic skill but require active involvement by the student. Sara Thomas, an art teacher, has developed a stop animation unit for high school students that examines the musculoskeletal basis of movement. Knowledge of structure of joints and their range of movement will allow the student to produce realistic depictions of motion.

William B. Stewart

## **Synopses of the Curriculum Units**

### **06.06.01**

#### **The Vitruvian Teen, by Wendy Decter, M.D.**

This unit is written as an introduction to a high school anatomy and physiology course. It is a multidisciplinary unit exploring the links between art and science. The unit is highly engaging and experiential and is based on a study of Leonardo Da Vinci's drawing of the Vitruvian man done as an illustration for Marcus Vitruvius Pollio's classic architectural writings. This famous illustration has been popularized in the book and movie "The Da Vinci Code." The final art project is the creation of the student's own life-sized "Vitruvian Teen." Students will interpret Vitruvius' work translated from the Latin as if they were Renaissance artists illustrating a translation of this ancient work, just as Leonardo was hired to do.

This unit can be readily adapted to middle and elementary school students. Each lesson can be simplified to emphasize a particular theme for the younger students. It can be used in science, studio art, art history, mathematics (proportion, measurement, and geometry), history or virtually any class by nature of its multidisciplinary lessons.

(Developed for Forensic Science and Anatomy and Physiology, grades 11-12; recommended for Measurement, Human Body, and Art, grades 4-6; and Anatomy and Physiology, Biology, Mathematics, Studio Art, and Art History, Middle and High School grades)

### **06.06.02**

#### **Your Amazing Body, by Alison B. Kennedy**

In this unit I introduce students to basic anatomy and how our body systems are interdependent. The unit shows the body's systems and how we can help to make these systems healthy. We will examine how artists depict bodies. We will also explain how these systems work through various activities, writing, and artistic creations. Finally we will explain what we have learned through group projects. The curriculum will allow the students to be introduced to anatomy in an accessible and creative way.

I hope that by teaching about the body in an engaging and creative way, I will be able to help my students to make healthy lifestyle choices. By knowing how their bodies work and how to keep them healthy they will lead healthier lives.

They also will be able to develop artistically through the projects in the unit.

(Developed for Science and Literacy, grades 1-2; recommended for Health, Literacy, and Art, Elementary grades K-4)

### **06.06.03**

#### **The Human Skeletal System: Inside and Out, by Barbara Natale**

This unit will provide students in grades four and five with this special opportunity to explore the skeletal system. The seven lessons allow students the chance to explore factual

information, write exciting expository stories about unfortunate injuries, travel to a foreign country and make an actual bone to display. During these lessons, students will come to the conclusion that science can be explored in fun and easy hands-on activities.

Any teacher, regular or special education, can utilize any or all of this unit, modified or used as they are written. These lessons allow teachers and students the opportunity to work together to better understand the wonderful human skeletal system and how truly awesome we are inside. Fourth and fifth graders are at a very impressionable age, and maybe one of the lessons in this unit will inspire them to become a doctor, nurse or a paramedic. Infusing hands-on art lessons, along with inquiry will hopefully instill a love for further exploring the human body.

(Developed for Science, grades 4-5; recommended for Science, Elementary grades 4-5)

#### **06.06.04**

##### **Drawing upon Our Five Senses, by Marisa A. Ferrarese**

The goal of this unit is for students to develop a meaningful understanding of the nervous system and five senses by incorporating visual arts and anatomy. Students will gain knowledge through scientific exploration, art analyses, and creative expression. While meeting the fifth grade science standards for the New Haven Public School system, this unit can be modified to address other grade levels.

The unit is divided into six sections, focusing on the nervous system and each of the five senses. Each section includes Web links to related scientific imaging and fine art connections that can be used to initiate and instruct each lesson. To demonstrate understanding, students will create an anatomy scrapbook based on suggested art activities also located at the conclusion of each lesson.

(Developed for General Science, grade 5; recommended for General Science, grade 5, and Science, grades 4-7)

#### **06.06.05**

##### **Making Connections: Exploring Our Brains through the Five Senses, by Heidi A. Everett**

This unit provides the framework for a thorough investigation of the brain's relationship with the five senses. The unit covers only the major anatomical structures associated with the central nervous system along with a brief introduction to the peripheral nervous system. This combination allows for a multi modal investigation of the brain's relationship with the five senses (hearing, touching, seeing, smelling, tasting). The peripheral nervous system is briefly covered due to the integral role it serves in conducting the sensory information acquired by the sense organs to the central nervous system. However, the unit can be easily modified to include a more advanced investigation of the anatomy associated with these two major divisions of the nervous system. The content covered in this unit adheres roughly to the curriculum standards for more advanced biology courses such as anatomy and physiology and advanced placement biology. I endeavor to design lessons with the intent of putting Howard Gardner's multiple intelligence theory into practice. The use of the five senses and the creation of art are designed to maximize the roles of multiple intelligences in learning (Campbell, 2004).

(Developed for Honors Biology and Biology, grade 10; recommended for Honors Biology and Biology, grade 10; Anatomy and Physiology, grade 11; and AP Biology, grade 12)

### **06.06.06**

#### **Teaching Neuroanatomy through Schematic Diagrams, by Justin M. Boucher**

This unit was created for use in an AP Psychology class to teach the brain and the nervous system in a relatively short period of time. The brain is an extremely complex concept, and it is difficult to do it justice in a limited space of time. It is the goal of this unit to circumvent that problem by trimming down the material and presenting it in a way that is both memorable and functional.

This unit asks students to break down the brain and the nervous system into their constituent parts and then diagram them according to relationship and function. It is a unit that can cut across learning styles and specialties as a function of its relatively flexible requirements. The process of schematic diagramming also allows the students to attach a skill set to the work, thereby giving the students another means of remembering and accessing the information.

(Developed for AP Psychology, grades 11-12; recommended for AP Psychology, Psychology, Biology, and Anatomy, grades 10-12)

### **06.06.07**

#### **Character Building from Inside Out, by Sara E. Thomas**

I teach visual art at a high school in New Haven. I teach classes which combine ninth through twelfth grade. Stop Animation attracts almost every student and is a vehicle to teach them about art, math and anatomy while enjoying themselves. The appeal of stop animation is that while you need to know the basics, everything does not have to be perfect because animated characters are often purposefully exaggerated. The course starts with students writing their own script, creating a frame-by-frame storyboard of their script and doing character sketches. A basic understanding of anatomy and underlying movement is an extended goal. Once students have a grasp of that they move from two dimensions to three dimensions by constructing a moveable model of their character and constructing an environment for their character. Once this is complete, students learn the basic camera angles and how to use a digital camera to film their own stop animation short. This unit offers a way to integrate technology and science into any art curriculum.

(Developed for Stop Animation, grades 9-12; recommended for Anatomy, Art, and Stop Animation, grades 9-12)