

Section IV:

**Teaching &
Learning**

TEACHING AND LEARNING

The purpose of this section is to illustrate what standards-based teaching and learning looks like in today's classrooms. Five vignettes representing experiences in early elementary, later elementary, middle school, and high school classrooms are featured in this section. They reflect teaching and learning based on content standards and benchmarks in social studies, English language arts, mathematics, science, and interdisciplinary study. The vignettes provide examples of Michigan teachers who are making decisions about how to incorporate the content standards and benchmarks into their instructional planning. They are designed to help educators begin a discussion about standards-based teaching and learning. The vignettes do not advocate a single best practice or method of instruction. They are not prescriptions of what must be done; they are examples of what can be done when teachers reflect on how to align curriculum, instruction, and assessment in order to promote meaningful student understanding of the content standards and benchmarks.

As an introduction to the vignettes, this section describes four standards which form the foundation of authentic teaching and learning. These standards are: higher-order thinking, deep knowledge, substantive conversation, and connections beyond the classroom. Effective implementation of the Standards for Teaching and Learning assumes that the classroom context is predicated on the belief that all students can and will learn. In order to be successful, instruction must not only incorporate the standards listed above, but it must also take place within an environment that provides sufficient social support to permit all students to learn no matter what their gender, ethnicity, socio-economic status, disability, English language proficiency, or preferred learning style. An atmosphere of positive social support occurs when the teacher conveys high expectations for all students and encourages students to take learning risks and try hard to master challenging academic work. The type of social support needed exists when the teacher's attitude and actions affirm the belief that all members of the class can learn important knowledge and skills. Positive social support requires creating a climate of mutual respect among all members of the class so that students with less proficiency are treated in ways that encourage their efforts and value their contributions. For more information about creating positive social support for learning and about selecting strategies that motivate all students to learn see the *Connecting with the Learner Toolkit*. (See "Appendix A.")

"In the long-term, education must aim for active use of knowledge and skill. Students gain knowledge and skills in schools so they can put them to work in professional roles—scientist, engineer, designer, doctor, business person, writer, artist, musician—and in lay roles—citizen, voter, parent—that require appreciation, understanding, and judgment."

David Perkins
Harvard University

For more information about how to analyze instructional needs and use authentic standards for instruction, see Tier II, *Discrepancy Analysis of Instruction* and Tier III, *Powerful and Authentic Social Studies*.

The vignettes on pages 6 through 36, illustrate how the standards can be incorporated into instruction.

Standards of Authentic Instruction

Authentic instruction is meaningful instruction. It helps learners move beyond memorization by creating learning experiences which demand sustained, disciplined, and critical thought on topics that have relevance to life beyond school. Research shows that when teachers and students engage in authentic instruction and learning, student achievement increases. Fred M. Newmann, Walter G. Secada, and Gary G. Wehlage at the Wisconsin Center for Educational Research have synthesized much of the research that relates to student achievement in *A Guide to Authentic Instruction and Assessment: Vision, Standards, and Scoring*. They tell us that students are most successful when they use and apply the knowledge they are learning and the abilities they are developing to solve real-world problems and conduct relevant investigations. The four standards of authentic instruction described by Newmann, Secada, and Wehlage are integral to the content standards and benchmarks. Each helps form a foundation from which increased learning and understanding stems. They provide a structure for instructional design in English language arts, mathematics, science, and social studies. These standards are:

- ◆ Higher-Order Thinking: Instruction involves students in manipulating information and ideas by synthesizing, generalizing, explaining or arriving at conclusions that produce new meaning and understandings for them.
- ◆ Deep Knowledge: Instruction addresses central ideas of a topic or discipline with enough thoroughness to explore connections and relationships and to produce relatively complex understanding.
- ◆ Substantive Conversation: Students engage in extended conversational exchanges with the teacher and/or peers about subject matter in a way that builds an improved and shared understanding of ideas or topics.
- ◆ Connections to the World Beyond the Classroom: Students make connections between substantive knowledge and either public problems or personal experiences.

Considering these standards helps individual teachers and instructional teams ensure that they are providing students with authentic learning opportunities. Incorporating the standards into instructional decisions helps create effective experiences for learning the knowledge and abilities described in the content standards and benchmarks. The standards of authentic instruction are embedded in the content standards and benchmarks. They help teachers enhance student learning by providing them with instructional opportunities that move them past a superficial understanding to an in-depth application of the knowledge and skills they are learning.

Making Instructional Decisions

The “Michigan Content Standards and Benchmarks” form a sound basis from which to build a strong curriculum. However, a strong curriculum is only one step. After districts answer the question, “*What must our students know and be able to do?*” they must ask themselves, “*What kind of instruction will enable students to demonstrate the knowledge and abilities defined in their curriculum?*”

The standards of authentic instruction and the topics listed as important curriculum considerations are essential guidelines for developing sound instructional programs. (See Section III, pages 5-6 for further explanation.) The vignettes presented in this section are useful tools for beginning a discussion about authentic teaching and learning. One way that the vignettes can be used is to have a group of teachers read them and then reflect on how the teachers and programs described in the vignettes address the standards of authentic instruction, as well as the important considerations for effective instruction. As teachers study the vignettes they will form learning communities that will support those who are seeking to align their instructional programs with the knowledge and abilities defined in their district’s standards and benchmarks.

The first vignette is written for an early elementary classroom studying social studies. The second is written for a later elementary focusing on English language arts. The third is written for a middle school classroom engaged in interdisciplinary study. The fourth is written for a high school mathematics class, and the fifth is written for a high school science class.

The vignettes can be used to facilitate professional development. In one instance teachers might be asked to read and reflect on one of the vignettes. In another instance teachers might be divided into five groups and asked to read and reflect on one of the vignettes. The vignettes could be distributed among the groups so that each group reads a different vignette. Then the various groups could be asked to share responses with the whole group.

After teachers have finished discussing one or all of the vignettes, they might be asked to reflect upon their own practice. They should think about an important unit taught in their course, and then consider the questions listed on page 4. Teachers should be given enough time to discuss their units in relation to how they address the standards and benchmarks and how they address the principles of authentic instruction. They might be asked to discuss ways they incorporate technology and interdisciplinary instruction into their teaching. They might be asked to discuss how they make connections with the learner and ways in which they have asked the student to consider preparing for a selected career. The questions presented on page 4 provide an example of the types of questions that might be discussed. These questions should be modified to reflect the curriculum goals of the district.

The following questions may facilitate group discussion:

I. How do the teachers create opportunities for students to learn and demonstrate the knowledge and abilities identified in the content standards and benchmarks?

- ◆ How does the teacher organize instruction so as to help students learn the knowledge and abilities described in the content standards and benchmarks?
- ◆ Are there any content standards and benchmarks addressed in the vignette that have not been identified?
- ◆ Which areas of the vignette might be expanded to incorporate content standards and benchmarks from other disciplines?

II. How do the teachers integrate the standards for teaching and learning into instructional activities?

- ◆ How does the teacher or program create opportunities for students to engage in higher-order thinking about the standards and benchmarks?
- ◆ What strategies does the teacher or program employ so as to ensure that students are processing knowledge and skills at a deep level of understanding?
- ◆ How does the teacher or program engage students in conversations that require them to discuss topics at a conceptual level?
- ◆ How does the teacher or program help students connect the knowledge and skills they are learning to the world beyond the classroom?
- ◆ How does the teacher or program use an understanding of learning styles to create diverse instructional approaches?

III. How does the teacher incorporate standards-based assessment into instruction?

- ◆ How does the teacher or program integrate assessment with instructional activities?
- ◆ How does the teacher align assessment with the standards and benchmarks?
- ◆ How does the teacher focus performance tasks on high expectations for student performance.

IV. How does the teacher integrate into instruction important instructional considerations such as interdisciplinary connections, technology, and school-to-work connections with the learner?

- ◆ Where and how does the teacher or program create opportunities for students to make interdisciplinary connections?
- ◆ How does the teacher or program ensure that students are making connections to important knowledge and skills incorporated within a content area?
- ◆ How does the teacher or program incorporate opportunities for students to acquire, organize, analyze, and present information using technology?
- ◆ Where and how does the teacher or program help students develop skill in the use of technology?
- ◆ How does the teacher or program help students recognize and refine skills and knowledge used in the workplace?
- ◆ How does the teacher help students explore career connections or implications for the knowledge and abilities learned during the unit?

Purpose of Vignettes

The vignettes included in this section are designed to illustrate how teachers might incorporate the Standards for Teaching and Learning (higher-order thinking, deep knowledge, substantive conversation, and connections to the world beyond the classroom) into their teaching units. The vignettes also illustrate how teachers might design instructional experiences which help students develop the knowledge and abilities identified in the standards and benchmarks. The Standards for Teaching and Learning and content standards and benchmarks being addressed in the unit are identified in the side-bar.

Social Studies

Early Elementary Vignette

Marcia Harris teaches kindergarten at the Brookside School in Bloomfield Hills, Michigan. Brookside is a private school and part of the Cranbrook Schools. Cranbrook Schools service approximately 1,550 students in 6 programs: 1 early childhood, 1 elementary, 2 middle schools, and 1 high school. There are 223 faculty members on the Cranbrook staff. Kindergarten at Brookside is a half-day program. Time spent on social studies instruction each day ranges from 30 to 40 minutes. Ms. Harris shares the responsibilities for teaching 20 four- and five-year olds with teachers, Virginia Walden and Katie Fiebig.

The unit, *Where Do I Live?*, was designed by Ms. Harris and Ms. Walden. The unit is 31 lessons which integrate geography with language arts, social studies, mathematics, reading, and art. *Where Do I Live?* includes activities that develop map reading skills related to finding locations, interpreting symbols, and determining direction. The geography skills are developed within the context of the geographic themes of location, place, movement, and region. Each objective taught is developmentally appropriate and follows the model of involving students first in an enactive experience, then an iconic one and finally a symbolic activity.

The unit focuses on seven key objectives which include:

- ◆ understanding that an address includes a number and street name;
- ◆ understanding that a map is drawn from an aerial perspective;
- ◆ understanding that a symbol is a representation of a real object;
- ◆ understanding that a city includes places where people work, live, and shop;
- ◆ developing the ability to calculate distance;
- ◆ developing the ability to formulate a constructive response to a social problem in their neighborhood; and,
- ◆ recognizing that money is used to buy groceries and services.

The culminating social studies activity revolved around formulating constructive responses to a series of social problems in their neighborhood. Ms. Harris believes that this added an important social studies dimension to the unit.

Developing Perspective

Where Do I Live? begins with the enactive experience of observing a familiar piece of climbing equipment on the playground—the climbing dome. On the playground the students talk about the shape of the dome with Ms. Harris, offer descriptions, and draw the shape of the dome in the air using their arms. The students are developing the concept of a profile perspective.

Back in the classroom students have the opportunity to view a photograph of the dome and talk about the dome's shape in much the same way they did on the playground. Several students volunteer to draw the dome on large sheets of paper. Each student then draws the dome from a profile perspective on smaller sheets of paper. Drawing the profile of the climbing dome translates the enactive experience into an iconic one. The unit continues on day three as Ms. Harris changes the perspective from which the students see the climbing dome. The students climb to the top of the school tower. From this point, they can see the playground and the climbing dome. Ms. Harris describes this perspective to the students as a bird's-eye view. In the classroom, using a photograph of what the students saw from the tower, the students describe the aerial perspective. Similarities and differences between the two perspectives are noted. The students draw the climbing dome again, this time from an aerial perspective. Drawing the dome from an aerial perspective is difficult for students initially. The students' drawings are displayed on a bulletin board. Each aerial perspective is matched with the profile perspective from the previous day.

To further develop the concept of aerial perspective, students observed a variety of objects in the classroom from both a profile and aerial perspective. In a variety of activities over the next few days, the students have the opportunity to view objects from both a profile perspective and an aerial perspective. The aerial perspective is possible by using climbing equipment in the classroom. Photographs of familiar objects are taken using both perspectives. The photographs become the basis of a sorting activity in which students separate the photographs into stacks. One stack of photographs contains objects shown in profile; the other stack containing the photographs of the same objects shown from an aerial perspective.

Making Maps

Having firmly established the concept of aerial perspective, Ms. Harris moves to the making of maps. Maps, of course, use an aerial perspective. The focus question is "What is a map?" Students begin by sharing what they know about maps. The most common knowledge held by the students is that road maps are used to help drivers get to different locations.

Students begin with making a map of their discussion circle. A large laminated paper oval is placed on the floor to represent the circle. *Fisher Price Play People* are used to represent each of the students. The teachers prepare the *Play People* by affixing a photocopied picture of each student's face to a *Play People* figure. The students then make a map of the discussion circle, placing their classmates on the paper oval in the correct location. Ms. Harris then moves the students and the students adjust the map accordingly.

In groups of five, the students recreate the map activity using photocopied pictures of each of their group members and pasting them onto paper circles. After finishing their maps, the group recreates the map for the entire class by forming their

Higher-Order Thinking:
Students produced new meaning and understanding after arriving at conclusions.

Connection to the World Beyond the Classroom: Students make connections between substantive knowledge and personal experience.

Deep Knowledge:
Students have gained and demonstrated connections and relationships to a complex understanding.

SOC.II.3.EL.1 Identify locations of significance in their immediate environment.

*Higher-Order Thinking:
Students move from concrete to
abstract synthesizing the
information presented.*

*Connections to the World Beyond the
Classroom: Pizza deliveries and
others coming to their home are real
experiences. The connection from
abstract numbers and words to real
places is made here.*

*Higher-Order Thinking:
Students generalize from concrete to
abstract symbolic.*

SOC.II.3.EL.1 Identify locations
of significance in their
immediate environment.

SOC.IV.4.EL.1 Identify examples
of markets they experience in
their daily life.

SOC.IV.1.EL.1 Identify ways
families produce and consume
goods and services.

SOC.IV.3.EL.1 Describe a good
or service provided by the local
government and the method of
payment.

group in the same manner indicated on the map. This activity links the enactive, concrete experience to the iconic experience of making a picture map. The next day the students use symbols to represent classroom objects to make a map of the classroom.

What Is An Address?

The focus of the lessons changes from the school to actual neighborhoods and cities in the next group of lessons. The first focus question is, "What does an address tell us?" The concept of an address containing two pieces of information is a complex one for four- and five-year olds. Students are given an address on either Cardinal or Bluebird Street in a pretend neighborhood created in the classroom. The floor is marked with colored tape to represent the two streets. Chairs are lined up to represent the houses. Each student moves into their house one at a time. Students have an opportunity to visit each other using their addresses to locate the person they will visit. Pizza and flower deliveries are made to the students with the teachers acting as the delivery persons utilizing addresses.

The next lessons require the students to use milk carton houses to recreate the neighborhood using the colored tape on the classroom floor as the streets. The "chair houses" are removed and students place their milk carton house on their assigned street at the right address. The next lesson transfers the floor map to paper. The students make a map of their classroom neighborhood.

The students are given envelopes with a milk carton house address on it. They are then asked to use the map of the school neighborhood to deliver mail to the correct student.

Using Taxes For The Neighborhood

What happens in a neighborhood? How do we use money? What can the government do? These were the focus questions of the enactive experience that followed the neighborhood map. Stores were set up and each student was given \$5 to spend. Before the students could spend their "play money," however, they had to give \$1 to the government as a tax. Ms. Harris reflects that the students really did not know what this meant. The students had a chance to use their remaining money to buy goods and services.

One child was selected to have a "fire" at home. The answer to the dilemma of "What should we do?" was discussed by the students briefly and it was agreed that calling the fire department made the most sense. "Who will pay the firefighters?" was raised by several students. The unanimous conclusion was that the government should pay them using the money collected as taxes. The concept of some people working for everyone and being paid by the government through the use of taxes was explored and reinforced.

Symbolic Experiences

Utilizing lists of addresses, students matched their classroom addresses with photocopied pictures of the members of the

class. In their journals they recorded the addresses of students they remembered and their own address. Students were given cards with their real addresses on them. Ms. Harris led the students in a discussion of the meaning of the numbers and letters. The students were given the assignment of drawing their real homes and putting the appropriate address on the picture with number stickers.

Working With Maps And Distance

Ms. Harris showed aerial photographs and a road map of the same area to the students. The students discussed the similarities and differences. Tracing paper was placed over the aerial photograph and the students traced over the roads and streets to create a road map from the photograph.

On the school grounds using the school as a base point, Ms. Harris led the students in a comparison of distances of various objects. The concept of near and far was explored. Ms. Harris led the students on a walk to experience the distance of one mile. The students walked 1/2 mile away from the school and then returned. Upon their return Ms. Harris led them in a discussion of the experience.

Using symbols for people and the school, the students estimated and then measured the distance between the school and some *Play People*. To further integrate mathematics into the unit, parents were asked to record the mileage between home and school. To prepare for the social studies activity, Ms. Harris placed pieces of tape with the student's name and photocopied picture on the rug. These pieces of tape designated the child's approximate distance from the school. Each student took a turn putting his/her *Play Person* on the name tape. A lively discussion followed during which the students were able to identify who lived near them, why it made sense that several of them were in a car pool together, and who lived the farthest from the school.

At the next circle time the students were given pieces of paper with their mileage from school recorded. Using linking cubes to symbolize the miles, the students made stacks to represent how many miles it was from their home to school. A distance graph was made using the photocopied pictures of the students and the linking cubes laid horizontally next to their picture. The graph was transferred to paper the next day. The unit of measure was one mile equals one linking cube.

Social Problems

The students have two opportunities in this unit to solve a community problem. In the first case Ms. Harris plays a messy neighbor, Sloppy Sally. It is explained to the students that Sloppy Sally has old cars and junk all over her yard. The mess is an eyesore and all the neighbors are unhappy. What will the community do? Students are divided into groups of five to discuss their ideas. The solutions are brought to Sloppy Sally one by one in an effort to solve the problem.

SOC.II.3.EL.1 Identify locations of significance in their immediate environment.

Substantive Conversation:
Students engage in extended conversational exchanges.

SOC.VI.3.EL.1 Compose brief statements expressing a decision on an issue in the school or local community.

Connections to the World Beyond the Classroom.

SOC.II.1.EL.1 Describe the human characteristics of places and explain some basic cause for those characteristics.

SOC.II.3.EL.1 Identify locations of significance in their immediate environment and explain reasons for their location.

The second problem deals with the location of a new park. The park is something that all the people in the community would like to have located in their neighborhood. Each group gets a chance to make a proposal. The proposals are then debated and a decision is made by the class.

What's In A City?

Students brainstorm a list of places they would expect to find in a city. Ms. Harris records the places for the class. The students visit a nearby city. On the bus tour Ms. Harris had the students identify the things they actually saw in the city. A new list was generated to later compare to their brainstormed list. Visits were made to the bank, post office and police station. Upon their return the students used unit blocks to recreate the city they visited.

The culminating activity involved each child drawing a picture and sending it through the mail to themselves. This activity was both enactive and symbolic. Envelopes were addressed by the students, their pictures were enclosed, and the class then walked to the mailbox to mail their letters, definitively answering the question *Where Do I Live?*

Student evaluation took place throughout the 31 day unit. Assessment included evaluation of drawings, maps, sorting activities, and group work.

The evaluations reflected objectives set in advance by Ms. Harris with an emphasis on the student's ability to analyze, apply, and demonstrate an understanding of disciplinary concepts.

Resources

The following trade books were read to the students throughout the unit. Each of the books reinforces one or more of the objectives.

Brown, Laurence and Marc, *Visiting the Art Museum*
Burton, Virginia Lee, *Katie and the Big Storm, The Little House, Mike Mulligan and the Steam Shovel*
Douglas, Florian, *The City*
Gag, Wanda, *Nothing At All*
Gibbons, Gail, *The Post Office Book, Mail and How it Moves*
Keats, Ezra Jack, *A Letter to Amy*
McMillan, Bruce, *Mouse Views*
Provinsen, Alice, *Farm and Country*
Pryor, Bonnie, *The House On Maple Street*
Rockwell, Anne, *Gypsy Girl's Best Shoes*
Stevens, Janet, *The Farm Mouse and the Country Mouse*
Wildsmith, Brian, *What the Moon Saw*
Wood, Audrey, *The Napping House*

ENGLISH LANGUAGE ARTS LATER ELEMENTARY VIGNETTE

Elizabeth Smith teaches third grade at Grayson Elementary School in Waterford. The Waterford School District is located in a northern suburb of Oakland County. The school district serves over 11,000 students in 21 schools: 15 elementary, 3 middle schools, 2 high schools, and an early education center.

Approximately 1,500 students qualify for free or reduced lunch, and more than 640 receive special education services. Over 620 teachers are employed, and their average seniority is almost 20 years.

Third graders in Ms. Smith's class learn first-hand about the responsibilities of good citizenship during a two-month-long thematic unit. They examine and apply criteria for responsible change in their own Waterford community through the study of a variety of class and contemporary texts, oral history, interviews, and field trips. A thematic statement and focus questions guide the study of community change.

The unit focuses on:

- ◆ generating and investigating important questions regarding community change;
- ◆ drawing key ideas from text to formulate generalizations and principles;
- ◆ applying key ideas and principles derived from multiple texts to establish a criteria for evaluating community change;
- ◆ selecting, recording, and organizing relevant information obtained during investigation for the purpose of drawing conclusions and presenting findings; and,
- ◆ using writing and speaking skills to effectively present conclusions.

The unit culminates in a presentation in which students describe and evaluate the benefits of the community change they have investigated and make recommendations for future change. They present their findings in front of an audience of their peers, district staff members, community members, and parents.

Ms. Smith, a veteran teacher, has been teaching a unit on Waterford for many years and decides to “remodel” it by broadening the topic to include the broader concept of community change. She also wants to experiment with incorporating the English language arts content standards and benchmarks into her curriculum design. What began as an experiment in remodeling has turned into a powerful learning experience for both Ms. Smith and her students.

Connections to the World Beyond the Classroom: The teacher considers what she knows about her students and what is likely to interest them. She selects a topic for study that is rooted in their experiences.

ELA.3.LE.1 Integrate listening, speaking, viewing, reading, and writing skills for multiple purposes and in varied contexts.

ELA.10.LE.1 Identify how their own experiences influence their understanding of key ideas in literature and other texts.

SOC.II.4.LE.1 Draw sketch maps of the community, region, and nation.

ELA.3.LE.5 Employ multiple strategies to construct meaning while reading, listening to, viewing or creating text.

ELA.3.LE.8 Express their responses to visual, written, and electronic texts, and compare their responses to those of others.

Substantive Conversation: The teacher engages students in a discussion which builds a shared understanding about the topic.

ELA.10.LE.2 Combine skills to reveal their strengthening communication arts literacy.

ELA.8.LE.2 Identify and use elements of various narrative genre and story elements to convey ideas and perspectives.

ELA.3.LE.3 Read and write fluently, speak confidently, listen and interact appropriately in situations, view knowledge, and represent creatively.

SOC.I.1.LE.2 Place major events in the development of their local community and the State of Michigan in chronological order.

ELA.11.LE.2 Identify the kinds of resources that are most useful and most readily available for the particular questions or topics they wish to investigate.

Deep Knowledge: The teacher encourages students to write frequently in their journals as a way of reflecting on their prior knowledge, contemplating new ideas, formulating opinions, and constructing new knowledge.

Eight year olds' lives are centered around nearby communities—homes, schools, and neighborhoods. Ms. Smith uses these familiar contexts as places to conduct initial data collections about change. The students take a neighborhood walk where they identify and record changes observed. They record or sketch the changes on a map provided and describe changes based on data they gather from parents and neighbors. They notice such things as new homes, tree removal, streets that have been paved, and new neighbors.

Back in the classroom, Ms. Smith facilitates as students, first in small groups and later in the total group, share their collected data and list the changes (on an organizer). She asks them to consider who might see the changes as positive and why, and who might see the changes as negative and why. After all observations and ideas have been shared, Ms. Smith asks her students to write in their journals conclusions they can draw about community changes and the effects they have on people who live and work there. After individually writing their responses, a classroom discussion provides students with an opportunity to hear each others' ideas.

To further develop the concept of community change over time, Ms. Smith has her students carefully review the book *Window* by Jeannie Baker and describe the changes they observe. Then they draw a window scene of their own depicting what their community might have looked like 100 years ago. Students use the writing process to develop a narrative text elaborating on their predictions. Classroom walls become a museum where students exhibit their drawings. They read their predictive narratives to one another as well.

Next, the president of the Waterford Historical Society is invited to visit the class. She brings along slides, photographs, maps, and other artifacts which pictorially show the Waterford community as it was 100 years ago. She posts them around the room, and students compare the real photos and artifacts to their predictions as shown in their drawings and writings. Once again they return to their journals and write their conclusions drawn about community changes and the effects they have had on people who live and work there.

Students now insert push pins on a map of Waterford to determine the locations of the 100-year-old places depicted in the photographs, and a field trip is planned to return to the original sites and collect data about how they look today. Armed with video cameras, sketch pads, journals, and cameras, the students set out for the investigation. When they return to the classroom, evidence of the sites as they look today is displayed alongside the 100-year-old photos and artifacts. Students are asked to identify what has changed and who might perceive the changes as positive and why, and who might perceive the changes as negative and why. Finally, students speculate in their journals about what determines if a change is positive or negative and share their speculations with one another in a whole class discussion.

By now the students are "hooked" on the theme and are ready to move into a more formal study. Ms. Smith reads *A River Ran*

Wild by Lynne Cherry and does a think-aloud in response to the focus questions:

- ◆ What determines if a community change is positive or negative?
- ◆ Does the environment exist to be used by humans?
- ◆ Do people have a responsibility to care for and protect the natural environment?
- ◆ Can special interests be reconciled for the common good?

She also uses a matrix and invites the class to join in a shared writing completing the matrix and using information from the text.

Change	Fast/ Slow	Reversible/ Irreversible	Natural/ Man-made	Beneficial/ Harmful and Why?

When it appears that students have gained a degree of comfort with the process, Ms. Smith does a book talk on a variety of other trade books depicting community change from a range of perspectives, cultures, time periods, and genre (e.g., *My Place* by Nadie Wheatley and Donna Rawlins, *The Great Kapok Tree* by Lynne Cherry, *Just A Dream* by Chris Van Allsburg, *Rain Forest* by Helen Cowcher, *Brother Eagle, Sister Sky* by Susan Jeffers). Children select several books and work in small groups to read the literature and respond to the focus questions, first in their individual journals and then together in a shared discussion. The small groups work together to add additional information to the matrix.

In order to complete the activity, the total class comes together to debrief the changes identified in various pieces of literature. They begin a discussion of the responsibilities people have to the community and to the natural environment.

Individually, students read a district social studies text, *Water Wonderland; A History of Waterford*. Periodically they pause in order to discuss examples of significant changes and record them on the ever-expanding matrix. They appear to be easily

Higher-Order Thinking: The teacher provides rigorous focus questions for the thematic study. She models strategies for recording, organizing, and analyzing information about the community.

MAT.1.1.E.2 Represent and record patterns and relationships in a variety of ways including tables, charts, and pictures.

ELA.3.LE.6 Determine the meaning of unfamiliar words and concepts in oral, written, and visual texts by using a variety of resources, such as prior knowledge, context, glossaries, and electronic sources.

ELA.7.LE.1 Use a combination of strategies when encountering unfamiliar texts while constructing meaning.

ELA.5.LE.4 Describe how various cultures and our common heritage are represented in literature and other texts.

ELA.9.LE.1 Explore and reflect on universal themes and substantive issues from oral, visual, and written texts.

ELA.8.LE.3 Identify and use characteristics of various informational genre and elements of expository text structure to convey ideas.

Deep Knowledge: The teacher enables students to achieve complex understanding by assigning readings that provide multiple perspectives on the issue.

SOC.I.3.LE.1 Use primary sources to reconstruct past events in their local community.

ELA.10.LE.3 Use oral, written, and visual texts to research how individuals have had an impact on people in their community and their nation.

ELA.11.LE.3 Organize and analyze information to draw conclusions and implications based on their investigation of an issue or problem.

ELA.3.LE.4 Distinguish between verbal and nonverbal communication, and identify and practice elements of effective listening and speaking.

Deep Knowledge: The teacher encourages students to continuously uncover new information and evaluate it in light of their developing hypotheses.

ELA.7.LE.4 Develop and use a variety of strategies for planning, drafting, revising, and editing several different forms of texts for specific purposes.

ELA.8.LE.1 Identify and use writing mechanics that enhance and clarify understanding.

ELA.9.LE.2 Draw parallels and contrasts among key ideas, concepts, and varied perspectives found in multiple texts.

ELA.9.LE.3 Use conclusions based on their understanding of differing views presented in text to support a position.

MAT.III.1.E.2 Organize data using concrete objects, pictures, tallies, tables, charts, diagrams, and graphs.

able to think about the community in terms of changes, instead of (as in the past) specifically about facts related to Waterford. It is exciting for Ms. Smith to see that she had been able to create experiences and enable her students to develop their understanding of broader connections.

Ms. Smith continues to push for depth of understanding and pairs her students with senior citizens who share their personal knowledge of changes in Waterford. The oral histories provide the young students access to primary resources and allow them to practice interviewing as a method for collecting data. Again they return to their journals to reflect on the focus questions and use the matrix to record additional changes.

Teacher and students identify and invite experts from the community (e.g., DNR, Township Planning Commission, a land developer, a builder, a member of the Oakland County Road Commission) who might serve as resources on Waterford change. The children determine who might be the most authoritative sources and write letters inviting them to become panel members.

When the panel is formed, students interview them to get their responses to the focus questions and their thoughts about criteria for responsible community change, as well as descriptions of past and projected future changes in Waterford. The students do a mature job of interacting with the experts. After the interview, students do a journal write, and add data to their matrix and add to their criteria for responsible community change. Thank-you letters are written and sent to both the panel and senior citizens.

As a check for understanding the students construct a Venn diagram comparing changes in the Waterford community with those in one of the trade books they read. They then develop a compare/contrast paper using the writing process. Their piece may take on the form of any of the genre they have been studying: poetry, picture book, essay, song, etc. Once again they refine their growing list of criteria for responsible community change.

Now Ms. Smith reviews the following requirements for the final performance demonstration and explains that the criteria they have been developing for responsible change will be an important component.

Performance Demonstration

As a group of community planning consultants, you will: collaboratively design a presentation that demonstrates your ability to access, process, organize, and interpret information regarding changes that have occurred in the Waterford community. Further, you will make recommendations for the future of your selected topic and describe how your recommendations fit the criteria for responsible community change. You will take a position on the thematic statement: People have a responsibility to consider the rights of others when making community changes. Your audience will be adults interested in your work (parents, member of

planning committee, etc.). Your work must be focused on one of the following choices:

- ◆ Business/Industry
- ◆ Transportation/Roadways
- ◆ Public Service—fire, police, library, sanitation, medical emergency, etc.
- ◆ Buildings/Homes
- ◆ Schools
- ◆ Teacher-Approved Choice

Include the following:

- ◆ A description of the change
- ◆ Cause(s) of the change
- ◆ Effect(s) of the change and those impacted
- ◆ Who would see the changes as positive and why?
- ◆ Who would see the changes as negative and why?
- ◆ A plan you would recommend that would be good for most of the members of the Waterford Community using the criteria for responsible community change.

Individually, do a one-page reflection which describes your growth in understanding of issues relating to community change. Be ready to discuss your growth using your journal as evidence.

Specifically: Your presentation should be no longer than 10 minutes. All members of your group must take part. You must select at least one of the following ways to show what you have learned:

- ◆ video
- ◆ game
- ◆ skit
- ◆ overhead
- ◆ teacher-approved choice
- ◆ photographs
- ◆ charts/graph
- ◆ drawings
- ◆ music/dance

You must be prepared to share the data you have collected and show the process you have used to get to the final presentation.

Ms. Smith wants to let students know how the presentations will be evaluated so she designs the scoring guide that will be used to evaluate their presentations. First, Ms. Smith identifies the standards that can be most directly assessed during the presentations. She identifies the following standards:

Depth of Understanding (Standard 9) — All students will demonstrate understanding of the complexity of enduring issues and recurring problems by making connections and generating themes within and across texts.

Ideas in Action (Standard 10) — All students will apply knowledge, ideas, and issues drawn from texts to their lives and the lives of others.

Inquiry and Research (Standard 11) — All students will define and investigate important issues and problems using a variety of resources, including technology, to explore and create texts.

ELA.6.LE.4 Reveal personal voice by explaining growth in learning and accomplishment through their selection of materials for different purposes and audiences.

ELA.7.LE.2 Monitor their progress while using a variety of strategies to overcome difficulties when constructing and conveying meaning.

ELA.8.LE.5 Describe and use the characteristics of various oral, visual, and written texts, and the textual aids they employ to convey meaning.

SOC.1.2.LE.2 Use narratives and graphic data to compare the past of their local community, the state of Michigan and other parts of the U.S. with present-day life in those places.

Then Ms. Smith reviews the benchmarks identified under each standard for later elementary students. She uses this information to review the unit to make sure that it includes learning opportunities that will help students successfully demonstrate the standards assessed in the culminating task. She consults the performance description charts for reading, writing, speaking, listening, and viewing to select criteria upon which to base her scoring guide. The performance description charts synthesize the knowledge and abilities included in the benchmarks for each English language arts communication mode. They help teachers identify proficient demonstration of the standards for their student-appropriate grade level cluster. Ms. Smith selects the following descriptions of proficiency because they directly relate to knowledge and ability she wants to assess at the end of her unit.

All students will:

- ◆ apply key ideas and themes derived from multiple texts that represent a balance of perspectives to formulate personal views on persisting issues and problems;
- ◆ use speaking and writing as tools for taking responsible action related to important issues, ideas, and problems in their school and community;
- ◆ use an increasingly wide variety of text forms, conventions, and elements of the writer's craft, and both verbal and nonverbal elements of the speaker's craft to achieve a purpose for a specified audience;
- ◆ investigate important questions, problems, or issues and use the most appropriate resources to generate supported answers and/or conclusions; and,
- ◆ select, record, and organize relevant information from a variety of resources to determine answers and draw conclusions in response to important questions, problems, and issues.

Ms. Smith uses the information in the performance descriptions to design her unit's culminating demonstration task. She wants the task to be an integrated assessment of her students' achievement of the English language arts standards so she combines some of the performance indicators such as those for reading, viewing, and listening and those for speaking and writing. Once Ms. Smith identifies what a proficient demonstration of the standards and benchmarks will look like, by using the performance descriptions, she is ready to design a tentative scoring guide.

First, she creates a description of what she expects students to do if they reach the goals of the performance demonstration described in the performance descriptions for the later elementary grade level cluster; she labels this a 3. Then she refines that description to identify what it might look like if students exceed grade level cluster expectations. She consults the middle school performance descriptions as she writes a description for another level of performance which she labels 4. She consults the lower elementary performance descriptions as

she writes what the demonstration for the later elementary grade level cluster will look like, and she also writes one for students whose presentation does not demonstrate the criteria identified for the performance task.

Scoring Guide:

- 4 Presents an accurate, compelling rationale for community change which includes an analysis of past, present, and future change. Communicates information and insights in a manner which engages the audience. Creatively uses visual and other supporting materials which enhance the key ideas or issues. Collects, analyzes, evaluates, and organizes data to produce polished written and oral text.
- 3 Presents a clear description of community change, supported by factual information which demonstrates the student's understanding of the reasons for change and their consequences and their recommendations for the future. Presents information clearly and effectively for their audience. Uses visual and other supporting materials which clarify key ideas or issues. Collects, analyzes, synthesizes, and organizes data to produce written and oral text.
- 2 Presents a description of community change, supported by some factual information which demonstrates the student's understanding of change and some recommendations for the future. Loosely organizes information with little attention to audience. Uses visuals without connections to key ideas or issues. Collects and attempts to organize data to produce written and/or oral text.
- 1 Presents a description of community change with little or no support that demonstrates the student's understanding of change or recommendation for the future. Shows little or no evidence of organization or consideration for audience. Uses none or few visuals. The visuals fail to make connections to key ideas or issues. Collection of evidence is scant or nonexistent.

She shares the scoring guide with her students so that they will know what is expected for quality performance. She knows that she will need to revise the scoring guide after assessing the presentations. Once she compares what students are expected to do with what they actually accomplish, she will be able to refine the scoring guide so that it more clearly identifies the characteristics of a quality performance.

At this point a great deal of information has been collected, analyzed, and processed, and students are mindful of the culminating performance required at the end of the unit. Ms. Smith decides it is time for students to do a more formal response to the focus question, giving specific reasons for their answers. In order to practice the skill of applying criteria for responsible change in new contexts, the students engage in a role play. They are divided into three groups, and each

Connections to the World Beyond The Classroom: The teacher helps students to understand various perspectives on the issue through the role play in which they act as local individuals, members of a planning commission, and citizens attending a town meeting.

ELA.4.LE.1 Describe language patterns used in spoken, written, and visual contexts within their own environment.

ELA.6.EL.2 Experiment with the various voices they use when they speak and write for different purposes and audiences.

ELA.7.LE.3 Apply new learning by forming questions and setting learning goals that will aid in self-regulation and reflection on their developing literacy.

ELA.11.LE.3 Organize and analyze information to draw conclusions and implications based on their investigation of an issue or problem.

ELA.11.LE.4 Using multiple media, develop and present a short presentation to communicate conclusions based on the investigation of an issue or problem.

MAT.III.3.E.3 Formulate and communicate arguments and conclusions based on data and evaluate their arguments and those of others.

ELA.8.LE.4 Identify and use aspects of the craft of the speaker, writer, and illustrator to formulate and express their ideas artistically.

ELA.12.LE.1 Develop individual standards for qualities of effective communication for different purposes, and compare them to their own oral, written, and visual texts.

group is given a scenario for a proposed change in their community (50 new lake front homes will be built, a new strip mall will be built in the lot next to the school, a theme park is proposed at the site of the old high school, etc.).

One group plays out the various roles of those who have a particular/vested interest in the proposed change and who reside in the area of the proposed change. Each group member is given a role related to the change (builder, homeowner, wildlife advocate, etc.).

They role-play how the proposed change will affect them and how they feel about the change. As the role-play goes on, another group serves as a planning commission responsible for deciding whether or not to approve the change, and the final group serves as the audience at a town meeting. This group determines the degree to which the planning commission applies the criteria for responsible community change. The groups rotate until all students have had an opportunity to participate in the role-play, serve on the planning commission, and be a member of the town hall audience.

In preparation for the culminating performance demonstration, the students conduct a collaborative inquiry. They select a topic, identify appropriate resources, collect, analyze, and organize data. Using criteria as a means for determining “responsible” community change requires them to consider various perspectives before making evaluations and drawing conclusions.

At last it is time to plan and rehearse the presentation. Ms. Smith and her students decide on the audience—parents, other teachers, and a variety of community members. The stakes are high. The students tailor their presentation to meet their audiences’ needs. What types of examples will they employ? What arguments and support will be important and persuasive in considering their recommended community change? Which medium and mode of presentation will make the greatest impact? Ms. Smith asks many questions as students consider possibilities and test options. The desire to do a quality job on this performance is evident. Motivation, engagement, and excitement run high.

The big day arrives and performances are conducted. Students are serious, impeccably dressed and groomed. Parents arrive and sit proudly by as the young community planning consultants present their compelling arguments. Papers describing personal growth are well documented using journal entries as evidence of growth. The children are articulate in describing the inquiry process. They comfortably use language that enables Ms. Smith to clearly see that the process of inquiry, as well as the concept of responsible community change are understood.

Ms. Smith carefully evaluates each performance. She analyzes how well students meet the criteria of both the content and processes demonstrated in the presentations. She provides the students with feedback by meeting with them in their small groups and showing them the strengths and weaknesses of

their presentations. She uses elements of their presentation and journals to illustrate her comments. Students discuss their presentations and set future learning goals, both individually and as a group.

"This is more, much better than I ever anticipated," says Ms. Smith. "I have just raised my expectations for third graders!"

Ms. Smith decides that one of the most important aspects of this unit is the culminating project. It provides her with a clear picture of what students know and are able to do. She's pleased that the process she used allows her to integrate both content and process in English language arts. She recognizes the potential this performance task has for engaging students in authentic inquiry that allows them to explore their own world.

ELA.4.LE.5 Recognize and use language appropriate for varied contexts and purposes.

Connections to the World Beyond the Classroom: The authentic project requires multiple activities that are intellectually engaging; a performance that has a real audience of parents and community members; and the application of learning to the real world.

SOCIAL STUDIES INTERDISCIPLINARY UNIT MIDDLE SCHOOL VIGNETTE

Richard Jankowski teaches eighth grade Issues in U.S. History—American Studies at the West Hills Middle School in the district of Bloomfield Hills. The goal of the class is to introduce students to the history of the United States as a nation from the age of European colonization through Reconstruction. Emphasis is placed on the study of persisting questions of public policy faced by American citizens. These public issues pertain to themes such as religious liberty, free expression, property rights, privacy, due process of law, equality, immigration, organized labor, foreign policy, and the exercise of power by government.

The course is divided chronologically into eras. Students construct a general understanding of each era and then focus on a public issue characteristic of the era. They pursue the issue by examining its historical origins and its context within the era. Through reading and discussion, they explore their own thinking about the issue and consider opposing points of view. To enhance their ability to make informed decisions as citizens, they compose persuasive essays which express a position on each issue and justify the position with reasoned argument, class discussions, and oral discourse.

SOC.I.2.MS.4 Comprehending the Past: Use historical biographies to explain how events from the past affected the lives of individuals and how some individuals influenced the course of history.

In January, Mr. Jankowski's students began a one-month interdisciplinary unit he named *Immigration*. The unit centered on a series of focus questions, "Does diversity make America stronger?" "What are the advantages and disadvantages of living in a multicultural society?" "Can a nation of diverse ethnic groups balance the wishes of the majority with the rights of minorities?" To explore these questions, the students acquired a strong foundation in the history of the reform era. Students used a variety of resources, employed computers, and conducted personal interviews. The integrated immigration unit included English language arts, mathematics, art, and social studies.

SOC.I.1.MS.1 Time and Chronology: Construct and interpret time lines of people and events from the history of Michigan and the United States through the era of Reconstruction and from the history of other regions of the world.

The intent of the unit on immigration and the reform era was to provide students with a historical perspective on immigration, and then to update the topic by relating it to present-day immigration issues and the public policy concerns they raise. Culminating activities focused on the question, "What should the U.S. public policy be regarding immigration?"

The unit was comprised of approximately 15 different activities. They included:

- ◆ viewing a film and a CNN special on immigration;
- ◆ writing narratives, poetry, a speech, a letter to the editor, and a fictional profile;
- ◆ designing, producing and displaying a stamp;

- ◆ conducting interviews with a family member and four recent immigrants;
- ◆ using a computer to graph data;
- ◆ presenting orally their interviews, poetry, and speeches to the class;
- ◆ discussing their understandings and opinions in class regarding immigration, and public policy, the rights of minority groups, and the fairness of current immigration tests; and,
- ◆ participating at the swearing-in ceremony of 50 new Americans.

Mr. Jankowski identified 10 benchmarks from five strands of the Michigan Social Studies Framework Content Standards to build this unit on immigration. The strands incorporated historic and geographic perspectives, inquiry, public discourse and decision making, and citizen involvement.

Mr. Jankowski has worked to build a classroom environment where students freely express their ideas in lively class discussions. They are encouraged to explore the implications of their ideas in elaborated responses. During class discussions, Mr. Jankowski acts as a moderator and facilitator. He probes students for deeper consideration of their ideas while maintaining the discussion's primary focus—interaction between the students.

To prepare students for discussion of public policy issues regarding immigration in the present day U.S., students viewed a video on the similarities and differences between historic waves of immigration and present day immigration. They also watched a CNN special which focused on present immigrants to the U.S.

West Hills is fortunate to provide community adult education in English for foreign language speakers during regular school hours. These very recent immigrants became a rich resource for the students. Each student was responsible for conducting four interviews. The interviews included questions about reasons why the person came to the U.S., the problems they have encountered while in America, and their plans and aspirations.

Students also discussed with their own families the history of their family's immigration to the U.S. and explored the challenges and successes of that event. Students in Mr. Jankowski's class are no more than third generation Americans, so their family's experiences were readily available to them. The interviewing, discussing, and writing about immigrants, real and imagined, was an important focus of initial activities. Discussion with their families revolved around why members of the family came to the U.S., who were the first in the family to immigrate, and how did it feel to be a newcomer.

Students were given data on past and current immigration and were asked to construct charts, graphs, and tables using a variety of software programs. They drew conclusions from the

SOC.VI.2.MS.1 Group discussion: Engage each other in conversations which attempt to clarify and resolve national and international policy issues.

SOC.VI.1.MS.1 Identifying and Analyzing Issues: State public policy issues and their related ethical, definitional, and factual issues as questions.

Substantive Conversation: Students gather in-depth information through conversations with the people they interview.

ELA.8.MS.3 Describe and use characteristics of various informational genre to convey ideas.

Connections to the World: Using their own experiences, students explore concepts and ideas related to immigration in today's society.

ELA.9.MS.1 Explore and reflect on universal themes and substantive issues from oral, visual, and written texts.

SOC.V.2.MS.4 Conducting Investigation: Report the results of their investigation including procedures followed and possible alternative conclusions.

SOC.V.1.MS.2 Information Processing: Use traditional and electronic means to organize social science information and to make maps, graphs, and tables.

Deep Knowledge: Students gain a deeper understanding of immigration issues by exploring texts and considering current event issues.

MAT.III.1.MS.1, 2, and 3 Collect, Organize, and Present Data. Students used computers to organize and present data provided to them.

MAT.III.2.MS.1 Describe and Interpret Data. Students developed interpretations from the organized data.

SOC.I.3.MS.4 Analyzing and Interpreting the Past: Compose narratives of events from the history of Michigan and of the United States prior to the era of Reconstruction.

ELA.9.MS.2 Synthesize content from multiple texts representing varied perspectives in order to formulate principles and generalizations.

SOC.VI.1.MS.1 Identifying and Analyzing Issues: State public policy issues and their related ethical, definitional, and factual issues as questions.

ELA.12.MS.1 Differentiate sets of standards for individual use according to the purpose of the communication context.

Higher-Order Thinking: Students apply reasoning skills to analyze arguments and take a position.

graphs and charts about trends in immigration. Eileen McDonald and Nancy Reuter, math teachers, led the activity which incorporated the use of computers, instruction on statistics, and the manipulation and construction of graphic representations of data.

Immigration of the past was explored through readings in English language arts with teacher Sam Washington and in social studies assignments from *American Is* (Merrill 1987), *Immigration* (Public Issues Series, Social Studies Education Consortium), and *Reasoning with Democratic Values* (College Press 1985). To update the issue, a list of current immigration restrictions under consideration by the Federal Government was given to the students. Through class discussion of the proposed immigration restrictions and a technique known as “four corner discussion,” students debated what the current U.S. position on immigration should be.

Fourteen days into the unit, the students were assigned a reading entitled “The City of Brotherly Love.” This reading detailed a controversy faced by Irish Catholic immigrants in the mid-1800’s in Philadelphia.

The students had seven questions to answer for homework to help them focus on the factual information presented. The story focused on the confrontation between largely Protestant nativists and Irish Catholic immigrants over the use of Protestant bibles in public schools. As tempers flared, Catholic churches were threatened by mobs and one was burned. The question presented for class discussion was, “Should Bishop Kendrick have allowed guns to defend Catholic churches?” After a full review of the facts of the case using the homework, students were asked to vote on the question presented. The vote took place without discussion and represented the starting point for discussion. Students could choose one of three positions—yes, no, unsure. The majority of the class voted unsure. Students were then encouraged to analyze the ethical issues involved. The teacher led the discussion encouraging students to elaborate on their opinions and clarify their responses. A lively debate took place. All points of view were heard and explored. The ramifications of certain proposed actions or inactions were explored.

Students supported their positions with factual information and the use of analogy. The students evaluated the arguments of other students assessing their persuasiveness. They critiqued arguments which were weak and pointed out flaws in logic. The ethics of defending a place of worship by violent means was hotly debated. Students demonstrated their understanding of the historical era by using it as a context for their arguments. Many students tried to predict the consequences of a particular course of action. Mr. Jankowski encouraged students to present their point of view, while making sure that students were able to add support to their arguments by returning to them for additional comments.

At the conclusion of the spirited debate, in which every student was engaged, a second vote was taken. Almost every student polled now had an opinion which they felt they could strongly defend. The unsure voters dropped to four students.

The following day, students were asked the questions, “What should the school board have done regarding requiring the use of a Protestant bible?” “Does the First Amendment apply to this case, how or why not?” “Does a group, because they represent the majority, have the right to ignore requests of minorities?” “Never?” “Always?” “When?” “What is the fairest way to deal with majority/minority conflicts?”

As students moved toward the conclusion of the unit, the emphasis moved from a historic examination of immigration problems to current immigration issues in the U.S. Letters to the editor stating and supporting their positions were one of the final assignments.

The culminating activities for the unit included the students participating in an actual swearing-in ceremony for 50 immigrants who successfully completed their application to become new citizens of the United States. While the responsibilities for the ceremony and school-hosted reception fell to Mr. Jankowski’s class, a majority of the 325 students at West Hills Middle School were involved.

At the conclusion of the unit, Mr. Jankowski’s students gained knowledge and insight into the history of immigration in the United States; explored their own family’s immigrant history; engaged in an evaluation of decisions made in the past regarding conflicts between immigrants and other established Americans, discovered that there is not one immigrant story, but many different stories, engaged in thoughtful inquiry and discussion regarding current issues involving immigration, explored ethical, political, and economic issues to formulate a position on current immigration policy, and were able to publicly defend their arguments and judge the validity, logic, and effectiveness of a variety of opinions regarding public policy related to immigration.

Student evaluation took place throughout the 20 day unit. Assessment included evaluation of homework, maps, poems, narratives, stamps, vocabulary quizzes, computer graphing, and letters to the editor.

The evaluations reflected objectives set in advance by Mr. Jankowski with an emphasis on the student’s ability to analyze, demonstrate an understanding of disciplinary concepts, and express ideas in elaborated written communication.

SOC.VI.1.MS.1 Identifying and Analyzing Issues: State public policy issues and their related ethical, definitional, and factual issues as questions.

Substantive Conversation: Students use discussion skills to present and critique arguments.

SOC.VI.3.MS.1 Persuasive Writing: Compose essays expressing decisions on national and international policy issues.

ELA.6.MS.2 Demonstrate their ability to use different voices in oral and written communication to persuade, inform, entertain, and inspire their audiences.

Connections to the World: Students use their knowledge of immigration issues to explore today’s problems.

SOC.VII.1.MS.1 Responsible Personal Conduct: Report how their behavior has been guided by concern for the law.

ELA.10.MS.3 Use oral, visual, and written texts to identify and research issues of importance that confront adolescents, their community, nation, and world.

Higher-Order Thinking: Students are evaluated on the basis of their ability to analyze and make judgments about immigration issues.

MATHEMATICS

HIGH SCHOOL VIGNETTE

This vignette is a composite of real experiences in a typical mathematics classroom. Names are fictitious, but the lesson and interactions among the teacher and students are representative of those found in middle-sized high schools that have diverse populations.

Deep Knowledge: Students are engaged in developing clear distinctions about content knowledge.

Higher-Order Thinking: Students are engaged in a lesson where they manipulate information and ideas in ways that transform their meaning and implications.

Connections to the World Beyond the Classroom: Topics are related to important mathematics that students encounter in real life.

MAT.VI.2.HS.3 Students use vertex-edge graphs to solve network problems to find circuits.

Ninth grade students in Ms. Bennett's class explore and investigate mathematical topics where they have the opportunity to develop arguments, solve problems, construct explanations, and work with relatively complex understandings. The students are currently studying a unit about graph models in the *Core-Plus* mathematics program.

The *Core-Plus* instructional materials are built upon the theme of mathematics as sense-making. Each year the program features multiple strands of algebra—functions, geometry—trigonometry, statistics—probability, and discrete mathematics connected by themes of data, representation, shape, change, and chance. Students combine facts and ideas in order to synthesize, generalize, explain, hypothesize, and arrive at conclusions or interpretations.

Instruction and assessment practices are designed to promote mathematical thinking through engaging problem situations that involve students, both in groups and individually, in investigating, conjecturing, verifying, applying, evaluating, and communicating mathematical ideas.

The unit focuses on:

- ◆ using vertex-edge graphs to represent and analyze real-world situations involving relationships among a finite number of elements, including scheduling, managing conflicts, and finding efficient routes;
- ◆ working in groups to communicate complex mathematical concepts; and,
- ◆ solving problems and making connections within mathematics and other content areas.

Topics within the unit include vertex-edge graph models, optimization, algorithmic problem solving, Euler circuits and paths, matrix representation of graphs, graph coloring, chromatic number, digraphs, and critical path analysis.

The culminating activity for the unit is an investigation of practical applications of the mathematics studied. Various fields are examined with distribution systems and construction scheduling drawing the most attention.

The unit has three lessons entitled *Careful Planning*, *Managing*

Conflicts, and Scheduling Large Projects. The lessons have from two to four investigations each.

By the end of Investigation 1 in *Careful Planning*, students have agreed that an efficient route should minimize the total distance. This investigation explores the most efficient route for painting school lockers. It includes getting the equipment from and returning it to the storage room so it will not waste effort on towing equipment past repeated sections, or if it does, this repeated section should be the shortest distance possible. This is written in students' own words in their summary, and then the class proceeds to the next Investigation, 1.2 *Making the Circuit*. The goal of the investigation is to have students find that there are some graphs which can be traced, along each edge once, returning to the beginning, and some which cannot. They are expected to develop their own tests for the existence of a circuit, and algorithms for finding a circuit. The following is a composite picture of several classes struggling with these ideas. Students are working in groups of four.

"Oh, good, I like puzzles," says Sybill, responding to an activity which asks students to try to trace some graphs. "This one is possible, and this, and ...," she continues.

"Are you all tracing these the same way," asks Ms. Bennett, joining the group.

Sybill says, "Yes, there is only one way to do them."

"Oh, really," says the teacher, in a curious voice that students have come to realize probably means there may be more to this than meets the eye.

"Well, I went like this," offers Carshonda, demonstrating with her finger.

"Could you say that out loud?" asks Ms. Bennett.

Carshonda starts, "A-C-D-A-," and almost immediately two other students in the group say they have started at different locations.

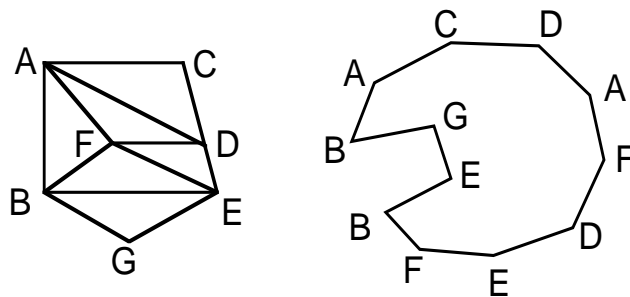
"Are all of these methods correct?" asks Ms. Bennett, and watches for a moment as individual students try different starting points. After a couple of silent minutes the group agrees that different starting points are possible for this graph. "Let's look at another graph that Sybill said was traceable," says Ms. Bennett. Three of the students in the group do this, but the fourth person is looking thoughtful. "Do you know what we are doing?" asks Ms. Bennett.

Miguel observes, "If it works, it should work no matter where you start." The others look up. "Well," says Miguel, "the job is just to go along each edge once. It's not like the paint problem where you have to start and stop at the equipment room. Once you know a way that works you could start anywhere in the sequence. Look!" and he writes his method A-C-D-A-F-B-E-G-B-A, in a loop. Others watch and seem to understand. Miguel picks another starting point and continues with the sequence, "C-D-A-F-D-E-F-..." The others are interested but want to get back to finding out which graphs are traceable. Miguel seems pleased

Deep Knowledge: The realistic context of the problem provides an opportunity for students to analyze content relationships within the investigation.

Substantive Conversation: Students become engaged in thoughtful discussions early in the lesson.

Higher-Order Thinking: Students have begun to manipulate information and ideas by exploring, explaining, and hypothesizing with circuits.



with his insight. Ms. Bennett mentions to Miguel that she would like him to explain this to the class later and moves on to another group.

The next group has already decided which graphs are circuits and which are not. They are now at the stage of drawing some that are circuits and some that are not, sorting them into two piles as directed in the activity. This results in ten examples in the “yes” pile and six in the “no” pile. Students are now asked to think about the differences between the graphs in the two piles.

“There must be a reason why these don’t work,” says Ms. Bennett, “but it’s surely not obvious,” and lets the silence continue. “What matters in this type of graph? Is it the lengths of the edges, or the shape of the graph or...?” prompts Ms. Bennett.

The graphs are just vertices and edges joined in a certain way,” answers Jerry.

“So it must be something to do with vertices or edges, maybe the number,” suggests Nancy. The others listen to this and start to count.

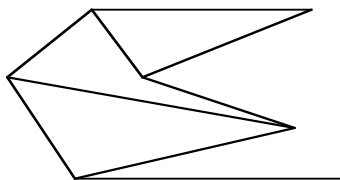
Then Jerry says, “well these have six vertices and don’t work, and these have six vertices and do. And this has seven vertices and works, and this has seven and doesn’t.”

“So, it’s not the number of vertices,” says Nancy.

Clearly some students follow up on this interchange by counting vertices of different graphs to check the logic of this interchange, but Nancy and Jerry have started to count edges.

“There’s always an even number of edges,” Jerry announces, “whether it works or not.”

“You mean, you can’t have a graph with an odd number of edges?” asks Ms. Bennett. She starts to draw a graph, with students suggesting ways to create an odd number of edges. They come up with a graph:



“Oh, I see, this one with an odd number of edges goes into the “no” pile. But how does that help us decide what goes in the

Substantive Conversation: Students are engaged in extended conversational exchanges that build an improved and shared understanding of the topic.

"yes" pile?" Tyrone wonders.

"Why did that last example not work?" asks Ms. Bennett.

"Obvious," says Jerry, "If you start at the vertex with only one edge than you can't possibly get back there. If you don't start there, you have to visit it sometime before the end of the circuit, and when you visit there you can't leave again."

"So your conjecture is that this graph doesn't work because you can't visit and leave this point?" responds Ms. Bennett, using Jerry's language.

Four heads bend very intently over the "yes" pile. "I think I have it," exclaims Tyrone. "Each vertex has to have *visit and leave edges*."

"Sounds like you are onto something," nods Ms. Bennett. "Why don't you check out that conjecture for both piles, and when you are convinced, could you each help another group, by giving them a hint about what to look for?"

Ms. Bennett quickly checks all the groups at this point, and finds that all groups have two piles of graphs. Two of these groups have some roughly formulated ideas about what characteristics a circuit must have. She calls these groups together and asks a spokesperson from each group to summarize their *rules*. As each group offers a *rule*, the other group pushes them for a clearer statement and comes up with counter examples, so, obviously, the rules still need work. As Ms. Bennett listens to the discussion, she notes that the group that came up with a *visit and leave* rule is now circulating around the other groups, offering broad hints about what to look for.

Ms. Bennett draws the class together. She asks, "Who can tell us what characteristics the circuits have that the others don't?" Several students offer variations, some of which are questioned by other students because they are not clear, and some of which are discarded because students can give a counter example. Eventually, Nancy finds a good definition the other students seem to agree with, and Ms. Bennett asks them each to write their own version of this in their notes, with examples of a circuit and non-circuit to illustrate it.

With only five minutes to go, the teacher asks Miguel and his group to come to the front of the room, and explain what they had found out about where to start. Each person was told to make a short statement.

Sybill says, "You always start at the vertex with the most edges."

But Miguel, who has been waiting for this chance, follows up with, "You can start anywhere, if the graph is a circuit."

The third student agrees with Miguel and the fourth draws a simple graph to illustrate starting at different vertices.

Ms. Bennett asks Miguel to give the explanation she'd heard him give earlier.

Deep Knowledge: The activity allows students to explore connections and produce complex understandings.

MAT.I.1.HS.5 Use patterns and reasoning to solve problems and explore new content.

Higher-Order Thinking: Students develop meaning as they analyze, synthesize, and evaluate ideas.

Substantive Conversation: Students present a summary of their hypothesis.

Connections to the World Beyond the Classroom: The activity has value in many real world applications.

Miguel shares his insights with the rest of the class. His peers listen to him very intently and have a few questions for him.

Nancy comments that this fits with the *visit and leave* rule. "It doesn't matter which vertex you start at, as long as you don't use up your last *visit* too soon."

Seeing that time is up, Ms. Bennett reminds the class of the homework, and adds that an extra part of the homework is to think of two examples where making a circuit would be useful.

As students leave, Ms. Bennett looks over the notes she has made about Miguel, Nancy, Sybill, Jerry, Carshonda and Tyrone. Who is asking questions independently? Who needs to listen to others more carefully? Who needs encouragement to share ideas? Who communicates ideas clearly? What evidence was there of reasoning? Looking over the class list, Ms. Bennett tries to remember if everyone had a chance to participate and makes a mark beside some students who may have been overlooked.

The next day students bring examples into class. They included school bus routes, freight train routes, airplane routes, making computer chips and even lawn mowing routes. Every student who had an example was asked to demonstrate with a simple graph and explain what the vertices and edges would model.

Lessons such as the one in this vignette often run for two to three class periods. The students' oral and written summaries validate the time spent on these lessons because it allows students to share ideas and reflect on and internalize new knowledge.

The lessons are connected so at the end of this lesson Ms. Bennett asks the students, "So you know whether a graph is a circuit or not, but how do you actually find a circuit? How do you write the instructions for the pilot of an airplane or a school bus driver?"

Note: The teacher in this vignette has selected the *Core-Plus* program for her ninth grade classrooms after a careful analysis of its content.

There are several excellent mathematics programs available to educators. Selecting a program should be based on a systematic analysis of how well the content addresses the mathematics standards and benchmarks and how well the instruction provides opportunities for students to engage in quality learning experiences that enhance their ability to problem-solve and apply mathematics knowledge to the world beyond the classroom.

SCIENCE HIGH SCHOOL VIGNETTE

This vignette is a composite of real experiences in several classrooms. Names are fictitious, but the classroom is representative of those found in middle-sized high schools that have diverse populations.

In this unit, students are working with a unit developed by Michigan teachers based on content standards and benchmarks and designed to illustrate the goals for scientific literacy (see Section II, "Michigan Content Standards and Benchmarks," science vision statement). The unit is part of the *New Directions* series and is used by teachers across the state in classes that range from general science to high school biology to adult education. Many regional Mathematics and Science Centers provide workshops on this and other *New Directions* units.

The unit focuses on:

- ◆ explaining how selected systems and processes work together in plants and animals;
- ◆ explaining how cells use food as a source of energy;
- ◆ explaining the process of food storage and food use in organisms; and,
- ◆ explaining how multicellular organisms grow based on how cells grow and produce.

Ninth graders in Ms. Lapham's general science class are studying a unit called *Food, Energy and Growth*. Last week they collected data on various foods by testing them in the chemistry lab to identify carbohydrates, proteins, and fats. The unit began with these chemical tests and would end several weeks later by having students design nutritious meals based on what they knew about the components of various foods.

Early in the unit, the students read in their text, "The three major components in food are carbohydrates (which include sugar and starch), fats and proteins." Then Ms. Lapham asked the class, "Where have you heard of these before?"

"I've seen those on cereal boxes," offered Katrina.

"We talked about fats in health class," said Arnold. "The book said that too much fat is bad for you."

Ms. Lapham asked, "Does anyone know why fat is not good in large amounts?"

"I think it has something to do with your heart," suggested Marie.

"Naw," Reggie countered. "They just tell you that about anything that tastes good."

Ms. Lapham found that her students didn't know that

SCI.I.1.HS.3 Students investigate the natural world as an integral part of science learning. Investigations give them opportunities to use their powers of observation, their abilities to reason and solve problems, and to use tools that are appropriate to the inquiry.

Deep Knowledge: The teacher checks students' prior knowledge, to design instruction based on what students know and that addresses their naive understandings.

SCI.1.1.HS.1 Students freely ask questions as they pursue understanding.

Substantive Conversation: Whole class discussion and debate is as typical as small group work; students listen to and respond to each other.

carbohydrates, proteins, and fats are what actually make up food (along with fiber); they didn't know what carbohydrates and proteins are used for in our bodies. This information about her students' prior knowledge agreed with the results of research conducted by the unit developers and helped to guide her as she planned her lessons and interacted with students in class.

When they first began their food tests, they did not have a strong sense of how to conduct these types of experiments. Ms. Lapham modelled the procedure and discussed with students the rationale behind it. She guided them in group interaction, making suggestions to facilitate group success.

Craig was ready with a question when Ms. Lapham got to table 4. "Why do we have to test water? It doesn't have any food in it."

"Craig, that's a good question. Let's see if anyone else was puzzled by that part of the procedure." Ms. Lapham walked to the front of the room and wrote "Time Out" on the chalkboard. After about 20 seconds, the room quieted and the students turned toward Ms. Lapham.

"Craig asked an important question about the food tests. I wonder if anyone else has the same question." She looked at Craig. "Please say your question again, Craig."

Craig repeated his question and the room erupted with assenting comments. "That's really stupid, Ms. Lapham," agreed Teresa. "Why should we test something that's not even food?"

Ms. Lapham turned to the whole class. "Did anyone notice a change in the indicator when it was mixed with water?"

"I did," volunteered Freya.

"What did you see?" asked Ms. Lapham.

"The iodine solution changed from dark orange to light yellow."

"So what did we learn by testing water with iodine?"

Joel raised his hand. "We learned that the iodine will get lighter when you add water, but that's not the change you're looking for."

"That's right, Joel," agreed Ms. Lapham. "When you tested other foods did you see any tubes that showed the same color change as the water?"

Tomas raised his hand.

"Yes, Tomas?" encouraged Ms. Lapham.

"Test tube #5, with the cooking oil in it changed to light yellow, too," he described.

"What does that mean?" queried Ms. Lapham.

Mark's hand shot up. "I've got it!" he cried. "There isn't any of the nutrient we're testing for in the cooking oil."

"You're right," smiled Ms. Lapham. "The test tube with water in it shows us what the solution looks like when there is no reaction. Does anyone know what scientists call that part of the setup?"

"That's the 'control,' isn't it?" offered Bonnie.

"Yes," replied Ms. Lapham. "It's an important part of experiment design."

"I get it, now," exclaimed Craig. "Without the water to compare to, we wouldn't know that the cooking oil change didn't really mean anything."

"Right, Craig," agreed Ms. Lapham. "Who can tell me which nutrient iodine tests for?"

"Is it starch?" queried Kayli.

"Well," coached Ms. Lapham. "What makes you say starch?"

Kayli said. "Test tube #2, the one with the corn starch solution, was the only one that changed to a different color. So, I think iodine reacts with starch."

"Which groups got the same result?" asked Ms. Lapham of the class. Several students raised their hands.

Ms. Lapham called on Al, who did not have his hand raised. "What result did you get?"

"I don't know," Al replied. Then he complained, "All the tubes changed color. I don't know how to tell which is the one to look at."

Ms. Lapham explained about the "control" in test tube #1, and how to use that as a comparison.

"Oh, okay," said Al. "I see now. Test tube #2 is definitely different."

"Continue your tests, now," directed Ms. Lapham. "You have about ten more minutes until clean up time. I'll give you the signal."

Later, as Ms. Lapham passed table 7, she spoke to Al. "Why do you think we're testing foods that are light colored?"

"I don't know," intoned Al. Then he thought for a moment. "The iodine is pretty dark, so I guess it might be hard to see the color change in a Coke."

"Exactly," laughed Ms. Lapham.

During the second food test, Ms. Lapham answered questions about the procedure and corrected problems as they occurred. She gave the students additional suggestions about group interactions.

Initially, students were resistant to working in small groups. The third day of the unit, the whole class ground to a halt.

Ms. Lapham got the class' attention. "I think we're having a problem functioning effectively in groups. These are real problems. These food tests are a lot easier to complete when everyone does part of the work. Let's make sure each person has a role and knows what to do. If you don't remember what the roles are, check the overhead. If your group can't figure out how to do the tasks from your book, raise your hands and I'll come help you."

Several hands went up at table 2. Ms. Lapham sat down with the students.

"Ms. Lapham, these results are confusing," said Carla.

Deep Knowledge: The teacher checks students' developing understanding often, keeping notes of students' progress both for coaching and for conferences with parents.

Substantive Conversation: Group work is the norm. Students of both genders and all ethnicities share key roles in groups.

"Yeah," agreed Marie. "We're getting all different colors."

"Let's look at your 'control' test tube results," directed Ms. Lapham. "What color change did you see there?"

"It changed from dark blue to light blue," stated Tomas.

"What does that tell us?" prompted Ms. Lapham.

"That the Benedict's solution will change to lighter blue when you add something it doesn't react with," explained Tomas. "We know that from what we learned in the first food test."

"But I still don't get it," Carla said. "Some of the other tubes turned light blue, but then we got all different colors."

Patiently, Ms. Lapham helped the students focus their attention. "Let's look at your observation chart. Which of the basic test substances caused the Benedict's solution to turn light blue?"

Marie read from the chart. "Corn starch solution, gelatin solution, and cooking oil all changed to light blue."

"And what color did you see in the remaining tube?" Ms. Lapham prompted.

"It turned orangey-red," reported Carla.

"And what substance were you testing?" Ms. Lapham asked.

"Glucose solution," Marie stated.

"What is glucose?" probed Ms. Lapham.

"It's a kind of sugar, isn't it?" suggested Marie.

"Right," confirmed Ms. Lapham. "So, what nutrient does Benedict's solution react with?"

"Sugar!" responded Arnold enthusiastically.

"Does this make sense so far?" Ms. Lapham checked all faces for assent. "Now, which other substances you tested showed light blue?"

"Only the cooked egg white," answered Tomas.

"What does that tell you?"

"That egg white has no sugar in it."

A light seemed to go on inside Freya. "Does that mean that any other color indicated sugar?"

"Exactly, Freya," Ms. Lapham turned to Marie and Carla.

"Does that make your results easier to understand?" They both nodded.

"Awesome," marvelled Arnold. "Everything else had sugar in it!"

"So, all the other colors mean sugar?" surmised Carla.

"Yeah, red, brown and even green?" asked Marie.

"You've got it," Ms. Lapham smiled.

As the students' familiarity with the nutrient testing procedures increased, the problems subsided. After the students tested the foods Ms. Lapham brought in, including peanut butter, cold cereal, milk, crackers, and hamburger, Josiah asked, "What about cookies? What would happen if we tested them?"

Rudy spoke up, "How about macaroni and cheese?"

"Or hot dogs?" offered Alicia. The room buzzed with suggestions.

Ms. Lapham raised her hand. "May I speak?"

"Sure, Ms. Lapham," laughed Reggie.

Everyone laughed, including Ms. Lapham. "If you have a food you'd like to test, bring it in tomorrow. We'll add that data to what we have collected so far," suggested Ms. Lapham.

"Awesome. I'm bringin' in bologna. My mom says it's loaded with fat, but I don't believe her," Arnold told Freya.

During the third food test, Ms. Lapham allowed her students to develop their own procedure. She listened to their discussions, focusing her attention on crucial aspects such as use of a control. She assisted each group of students in their efforts to cooperate with each other.

Working this way was new to many of her students. Some didn't like it at first—it seemed too hard and they didn't know exactly what to expect. They were used to "the bargain"—the tacit agreement between some students and some teachers that says "I'll behave myself if you don't push me too hard." Making these kinds of changes in her teaching required some new approaches to classroom management, some "heart-to-heart" talks with students about why this new way of learning was important, and some additional modeling and structuring of class activities.

Ms. Lapham slowly cruised the room, listening to the students' conversations, watching their faces. Her presence was noticed by the students and helped some of them stay on task. Most of them, however, simply ignored her unless they had a problem their group could not solve. Ms. Lapham stood next to table 6, listening to the conversation at table 7.

"We're supposed to work this out as a group," said Janine.

"I don't think it will be too hard," suggested Josiah. "We just use the same basic procedure as in the second food test."

"Except we don't have to heat it," Kayli reminded them.

"Right," agreed Ken.

Ms. Lapham stepped up to table 7. "Josiah, how about if you write out the first step of the procedure. Then you can pass the sheet around the table, with each of you writing one step."

"Good idea," encouraged Al. They went to work. Ms. Lapham relaxed and moved on.

At table 4, Craig and Mark were discussing the setup.

"There are four test substances, so we need four test tubes," Mark stated.

"I think we need five," suggested Craig.

"Why?" Mark challenged.

"Remember, we need one for the water — you know, the 'control,'" explained Craig calmly.

"Oh, yeah," recalled Mark, relaxing. "We have to know what it looks like when no reaction takes place."

Ms. Lapham continued around the room and overheard this

Higher-Order Thinking: Responsibility for performance of key skills and habits of mind is gradually released to students.

discussion at table 2.

"This one is pink and this one is violet," said Carla in a surprised voice.

"I think we should compare the foods to the control, not to each other," Tomas reminded her.

"Oh, yeah, okay," agreed Carla. "But why are there so many different colors in these reactions?"

"Maybe there are different kinds of proteins," suggested Freya.

"Awesome," exclaimed Arnold. "Look, these two are pink, and this one is violet. Do you think that means that egg white and cottage cheese are more alike than peanuts and egg white?"

"Ms. Lapham, is that true?" asked Marie.

"I think we would need to run a few more tests to be sure of the relationship. But that would be a good hypothesis to test. Would you like to try it?" encouraged Ms. Lapham.

"Nah, we'll just stick to these tests for now," decided Arnold.

"So, wait a minute, are these all positive tests for protein — the pink, purple and violet?" asked Carla.

"They're all different than the control, aren't they?" coached Tomas.

"Yeah," admitted Carla. "So, I guess all of them contain protein."

"Hooray," cheered Ms. Lapham silently and continued cruising.

As the experiments progressed, each group recorded its results on large posters around the room, making long lists of foods that contained fats, proteins, sugars and starches. The lists would be used throughout the unit, as a way of bringing students' attention back to specific foods.

While they were spending their class time conducting these experiments, students had the assignment of bringing in food labels and magazine advertisements containing information and claims about health products, vitamins, diet programs, and foods. They used the labels to analyze more complex foods and construct healthy menus, and they discussed and critiqued the claims made in the ads.

As the unit continued, the class explored what happens to food after it enters their bodies. The questions for this part of the unit were: "Where does food go after you swallow it?" and "How is food used by your body for energy and growth?" They started by drawing pictures of the path they thought food follows as it goes through their bodies, and writing explanations of what happens to it along the way.

Most of their initial pictures showed parts of the digestive system: the throat and the stomach, and in a few cases the intestines. Several showed where waste exits the body. Almost none showed any parts of the circulatory system—the blood vessels that carry digested food away from the intestine to every cell of the body.

SCI.II.1.HS.1 Students evaluate the strengths and weaknesses of claims, arguments, or data.

Higher-Order Thinking: The questions posed by the teacher and by the curriculum materials are essential questions for understanding the importance and depth of the discipline, and allow for the development of higher-order thinking. Real-world examples, applications, and career contexts are used often—in this case, ones that relate to biotechnology.

Ms. Lapham realized this was normal. The annotated teacher's guide for the unit contained notes about students' thinking, which prepared her for typical responses. She read in the guide that while most students know from everyday learning that food gets digested, they do not know that digested food has to go to every cell in the body to be used for energy and growth. Based on the research the unit developers cited, she was not surprised when her students did not include the circulatory system in this initial drawing, but she knew that her task was to get them to understand that food does not just go to the stomach, get digested and somehow "used," and then exit the body as waste. She knew that she had to get them to connect the processes of the digestive system with the processes of the circulatory system, and perhaps even more difficult, to help them understand the biochemical processes that take place in each cell.

To accomplish this, she would use a combination of computer models, video footage of actual digestive system components, lab activities, simulations and library research to help students piece together a complete picture of how food is used in the body. In one of the lab activities, students investigated how our body's need for oxygen and food relates to our levels of exercising, by collecting data on the body's production of carbon dioxide during exercise. They used the data collected from this investigation to piece together an understanding of the chemical processes going on in our cells when food is used for energy.

Towards the end of the unit, students would use their new understanding to explain what happens when people gain and lose weight. They would actually calculate the weight gained and lost when people eat a meal, use the bathroom, exercise, and simply breathe. This extension activity would help them connect the diets they analyzed earlier with the actual effects of food in their bodies.

At the end of the unit, Ms. Lapham had students construct "healthy eating" posters to be displayed in the middle school. On the posters they were to draw again the path they think food travels after it is eaten, and write about what happens to food in their bodies. She would check their explanations for several key elements:

- 1) A complete understanding of the flow of food material through the digestive system (mouth, throat, stomach, small intestine) and circulatory system (blood vessels) to the cells (in every part of one's body), including an explanation of digestion. (Each food component is broken into smaller and less complex molecules—proteins into amino acids, fats into fatty acids, and carbohydrates into glucose, which can then pass from the digestive system into the circulatory system; see benchmark/objective SCI.III.2.MS.4, Using Life Science Knowledge about the Organization of Living Things: *Explain how selected systems and processes work together in plants and animals.*)

Deep Knowledge: Students communicate their findings and express their ideas in a variety of ways, including drawing, writing, and speaking. Alternatives to spoken and written descriptions are often used, including maps, diagrams, flow charts, cutaway views, computer models, etc.

SCI.I.1.HS.7 Students learn from a variety of materials, not just the textbook.

Connections to the World Beyond the Classroom: Students use mathematics appropriate to understanding the content.

Deep Knowledge: The teacher challenges each student to think deeply about content, to practice the skills they are learning, and to apply what they know to new problems.

2) A chemical description of how digested food is used by cells for energy, including an explanation of the role of breathing in this process. (Cellular respiration is the chemical reaction of glucose [from food] with oxygen [from breathing]—both delivered to cells by the circulatory system; energy is released in this reaction, to power all cell functions, and the by-product of carbon dioxide is carried away from the cells by the circulatory system to be released through breathing; see benchmark/objective SCI.III.1.MS.3, Using Life Science Knowledge about Cells: *Explain how cells use food as a source of energy.*)

3) A description of how we grow by using the food we eat, and why it is important to eat certain foods. (Amino acids from protein-rich foods, along with vitamins and minerals from fruits and vegetables, are delivered to our cells by the circulatory system, then used as building blocks to make hundreds of different proteins, which are used to make the new cells that are added to our existing muscle, bone, and other tissue cells, resulting in growth and weight gain; see benchmarks/objectives SCI.III.2.HS.3 and SCI.III.1.HS.2, Using Life Science Knowledge about the Organization of Living Things: *Explain the process of food storage and food use in organisms;* and Using Life Science Knowledge about Cells: *Explain how multi-cellular organisms grow, based on how cells grow and reproduce.*)

Deep Knowledge: Teachers remediate as necessary.

If their posters still contained naive ideas about digestion and food movement, or about oxygen use and carbon dioxide production, or how weight is gained or lost, she would find additional ways to help individual students come to understand these important ideas.

Studying the vignettes is an effective way to begin a discussion among teachers about the importance of integrating rigorous content standards and benchmarks with effective standards for teaching and learning. The vignettes point out the importance of teaching for understanding. They serve as an example of the way teachers focus their students' attention on the important content of the curriculum, the content that helps students make connections to the world beyond their classroom and that helps students generate new understandings of the knowledge deemed important by society. They provide examples of how teachers align learning opportunities that engage students in exploring content at high levels of thinking and help them apply knowledge in complex, problem-solving situations that have relevance to their own lives. They illustrate how teachers incorporate higher-order thinking, deep knowledge, substantive conversation, and connections to the world beyond the classroom into the learning experiences they provide their students. They also provide a context for discussing how teachers can integrate into their daily instruction other aspects of curriculum such as strategies that help the classroom:

- ◆ connect with the learner so that all students can learn,
- ◆ utilize technology in meaningful ways,
- ◆ make interdisciplinary connections within and across content areas, and
- ◆ make connections to career preparation within the core content areas which help students understand how school knowledge has relevance to the workplace.

The goal of the vignettes is to show educators how teachers can align curriculum, instruction, and assessment for the purpose of preparing students for further learning and more effective functioning in their lives.

The vignettes offer one way of presenting a clear picture of how instructional practice influences quality learning. They help teachers discover strategies for incorporating the standards and benchmarks into instruction. There are a variety of best practices and methods of instruction, and the ones included in these vignettes illustrate only a sample of the instructional methods that can be used to successfully create an environment in which all students achieve high content standards.

The vignettes are meant to begin a discussion of what best practices might look like. In order to increase their effectiveness, the vignettes should be supplemented with examples from successful teachers in the district who are willing to share how they go about planning instructional opportunities. They should also be supplemented with discussion on research that addresses the characteristics of good instruction. When educators have frequent opportunities to discuss best practice, they develop and refine their teaching skills and learn how to align instruction with curriculum and assessment.