

## ***Chapter 4***

### ***Technology Standards for Students***

#### ***Introduction***

You are preparing to teach in the 21<sup>st</sup> century. Does that mean that you will teach what you learned? Think for a moment about how you learned about pi ( $\pi$  or 3.14...). Can you explain pi or do you just know the value? Were you just told that this number is used in finding the circumference of a circle (Circumference =  $\pi$  d, where d is the diameter of the circle) and the area of a circle (Area =  $\pi$  r<sup>2</sup> where r is the radius of the circle)?

Mr. Dixon in the *Snapshot of 21<sup>st</sup> Century Teacher's Unit Outline* organized a unit to involve the students in a search for the relationship of the circumference to the diameter of a circle or pi ( $\pi$  or 3.1456...) rather than just telling them. Think about how you were introduced to the relationship of the circumference of a circle to its diameter and consider these questions:

- Were you just told that the value was just a little bit more than 3 but less than 4 or perhaps told it was approximately 3.14?
- Why shouldn't the teacher just tell the students now?
- Why use all this valuable teaching time to have the students develop an understanding of pi?
- Why involve the various technologies – *Geometer's Sketchpad*, NIH imaging software, spreadsheets, World Wide web?

- Why waste time with a digital camera?
- Why can't you just teach this idea the same way you were taught?

Part of the answer to these questions is that what knowledge is valued has changed in the 21<sup>st</sup> century. Knowledge that 3.14 is an approximation for pi is no longer considered essential; simply using the pi symbol on the calculator returns an acceptable approximation for pi. Understanding pi as the ratio of the circumference to the diameter and being able to use that ratio in thinking about and solving problems is more important knowledge in the 21<sup>st</sup> century.

Another part of the answer to all of these questions is the increased access to information and technology. Consider this announcement in the *Los Angeles Times* on February 19, 2004:

Video. Music. Photos. TV. DVD. (10 years ago, this could have cost 17 million dollars.) ... [the XX computer system] combines home entertainment and home computing in a revolutionary way. While it's quite capable of all the computing basics, it can also play DVDs, record and replay live TV, store thousands of CDs and play them on its high fidelity speakers – even organize, display and e-mail your digital photo collection ... it starts at just \$1499.99!

This technology system is new in 2004! In a short period of time from this date, however, more powerful and more accessible technology systems will be on the market – likely for much less! For this reason, contemporary, content-area curricula requires that students continue to learn basic skills with multiple current technologies, learn to use

these technologies in the search for solutions to problems, and basically learn to use technologies as they learn.

Another part of the answer is that the views of learning and teaching have changed. Students' learning is now focused on their activities in constructing their own understandings through multiple experiences rather than simply receiving information. Teachers are expected to guide students as they explore the various experiences and build their knowledge. Teachers need to engage students in learning to use a variety of tools through a variety of activities. Teachers need to scaffold their students' learning activities, guiding the students' progress in learning.

To adequately prepare students for living, learning and working in the 21<sup>st</sup> century, you, as their teacher, must be prepared to enable your students to learn differently than how you learned. The nation has reached consensus that an American education needs to be transformed to meet the needs of the emerging Information Age. Policy makers and public citizens have called for higher standards for what children need to know and be able to do. As a result most content areas have identified new curriculum standards to guide the education of the 21<sup>st</sup> century. In recognition of this direction, the National Educational Technology Standards for Students (NETS•S), identified in 2000, describe six areas to promote the use of technology as an “integral component or tool for learning and communications within the context of academic subject areas” (ISTE, 2000, p. 17). These standards form a coherent system of quality assurances to guide your curriculum and instruction in a manner that will support your students in meeting the 21<sup>st</sup> century goals for education.



### *Chapter Learning Objectives*

1. Illustrate tools students use and need for learning and communicating in the 21<sup>st</sup> century.
2. Describe why it is important to learn to use technology as a tool within the context of the academic subject areas.
3. Discuss the National Educational Technology Standards for Students (NETS•S).
4. Describe ways teachers can redesign their curriculum and instruction to support students in meeting the NETS•S standards for students.
5. Explain how teachers might use the NETS•S standard performance indicators in developing their curriculum.
6. Discuss how the NETS•S standards for students connected with subject area curriculum standards.

## *Snapshot of 21<sup>st</sup> Century Teacher's Unit on Pi*

Mr. Dixon is teaching sixth grade in a self-contained classroom. As he considered the mathematics lesson he was to teach, he knew that he wanted to connect the mathematics with the real world and at the same time introduce his students to some new technologies they might use as learning tools. More importantly, he wanted to use a problem to actively engage his students in an exploration about pi rather than simply telling them the value for pi and the important formulas for circles. For these reasons, he outlined the unit on pi to meet these goals.

### **Problem for sixth grade students to investigate:**

What is the relationship of the circumference of a circle to its diameter?

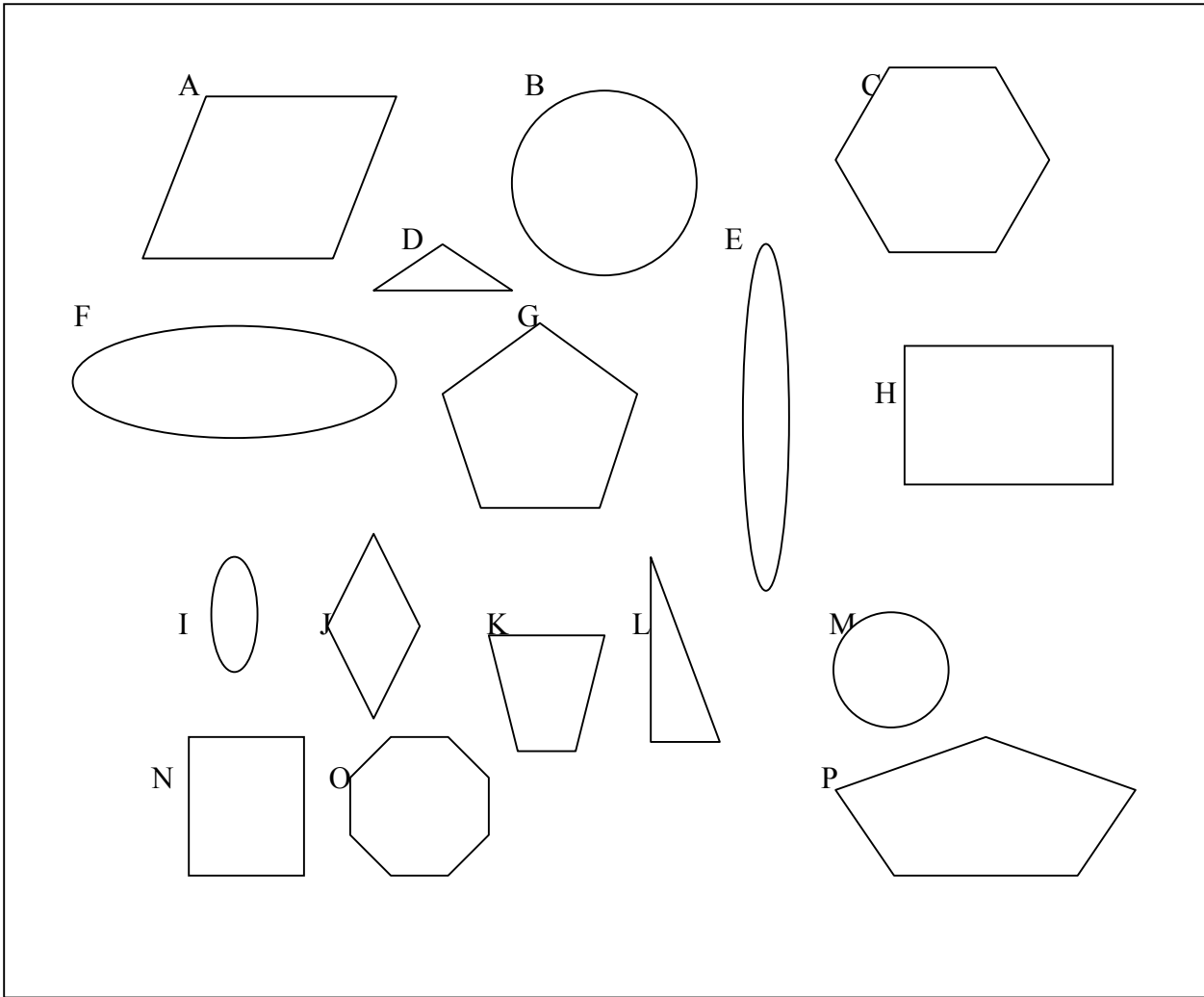
### **Supporting questions for this problem:**

- ♣ What is a circle?
- ♣ What real world objects have a circular appearance?
- ♣ What information defines a circle?
- ♣ How can the circumference and diameter be measured for large, distant circular objects like the Moon, Venus, or Earth?

### **Unit Plan for engaging students in investigating these problems:**

#### **Day 1**

1. **Students work in pairs on a worksheet** (Figure 4.1) to sort two-dimensional objects, given the instructions identify as many different ways to sort the objects, explaining the sort.



Directions: Sort these objects into at least two different groups where each group has a common characteristic.

Figure 4.1 Two-dimensional object worksheet

2. **Students work in groups of four**, comparing their ideas for sorting the objects.

♣ Whole class discussion of the various sorts.

**Key questions for discussion:**



1. What are the different sorts? (Possible sorts: polygons, round objects; circles, non-circular objects; objects with angles, oval objects; polygons, circles, ovals)
2. How does the group of polygons differ from the group of round objects? (Possible differences: corners versus non-corners; sides versus no sides; angles versus no angles)
3. How does the group of circles differ from the groups of polygons and ovals? (Expected response: You can fold circles in half at any point in the curved-edge)
4. If you take a picture of real world objects, which would have the shape of a circle? (Possible objects: coins, bicycle wheels, clocks, door knobs, moon, sun, Earth, lamp shades)

**Homework:** For Day 2 class, bring pictures of objects that show circular forms.

## Day 2

1. **Demonstration:** Different ways to create circles
  - a) Tack one end of string at the center of the paper on the bulletin board, tie pen to other end, use the pen to draw the circle on bulletin board paper.
  - b) Use a compass to create a circle on paper. How is this method is like the method with the string?
  - c) Using *Geometer's Sketchpad* software, create two points, labeling them A and the B. Select first point A and then point B; **Construct circle by**

**center point.** See Figure 4.2. Have students explain how this method is similar to the other two methods for creating a circle.

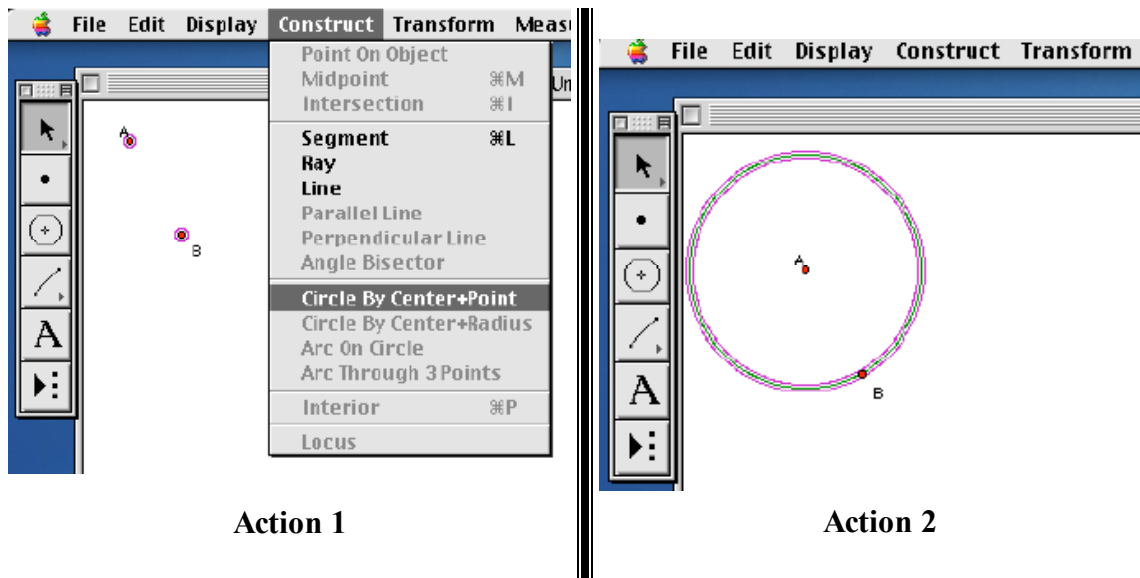
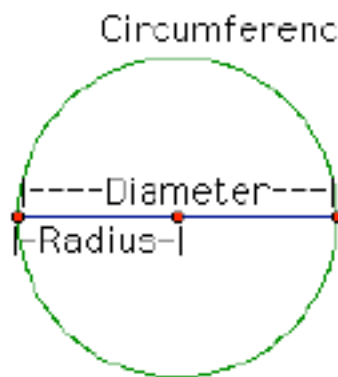


Figure 4.2 Progression for creating a circle with *Geometer's Sketchpad*.

2. **Class discussion:** Identify major parts of a circle



- a) Circumference – distance around the object, similar to the perimeter of an object
  - b) Radius – distance from center point of circle to the edge of the circle
  - c) Diameter - distance from one edge of circle to other edge of circle when folded in half. Equal to twice the radius.
3. **Measurement activity.** Students use string and rulers to measure circumference, diameter and radius of objects in the classroom (clock face, doorknob, wastebasket top, etc.). Record data in a table:

Circumference	Radius	Diameter

4. **Digital camera activity.** Groups of two take digital pictures of several different circular objects, perhaps of the pictures they brought to class.

**Homework:** Collect circumference, radius, and diameter data of circular objects from home. Bring to class Day 3.

**Day 3.**

1. **Demonstration:** Display a different way to measure circumference and diameter of circular objects using new technology – NIH Image software, a public domain image processing and analysis program that was developed through the National Institute of Health (NIH). This software can acquire, display, edit, enhance, analyze and animate digital images; it is similar to the

ultrasound software that is used to measure the circumference of a baby's head. Explain to students that ultrasound technology uses sound waves to create images of shapes inside our bodies and that this data is used in determining the health of the unborn baby.

- Launching the software
- Open an image of Venus (Figure 4.3)
- Measure the circumference of Venus in pixels – explain pixels as the unit of measure
- Measure the diameter of Venus in pixels

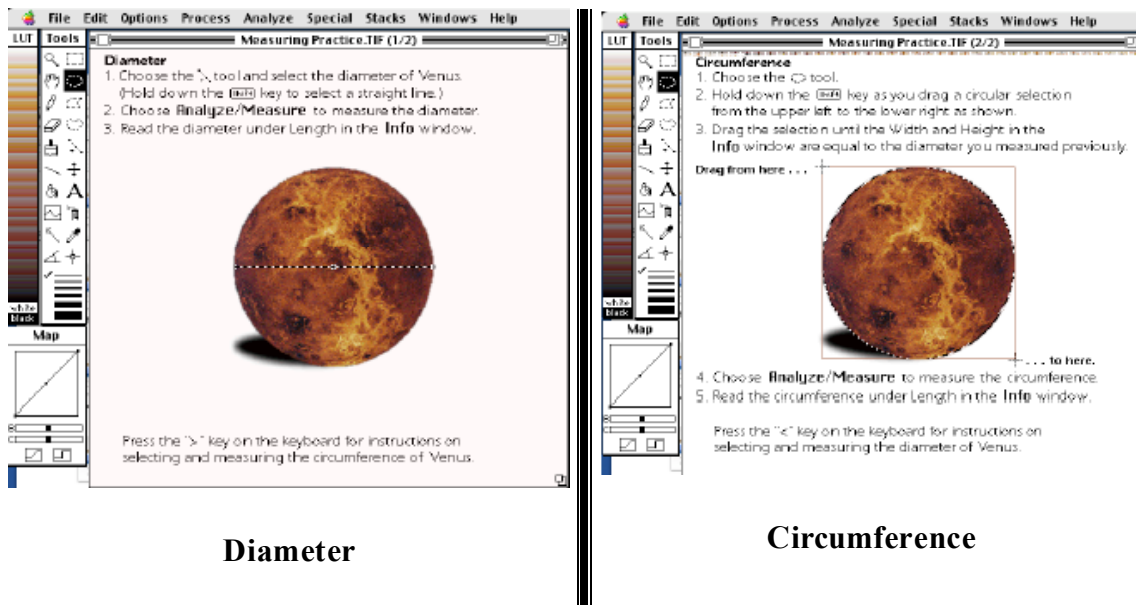
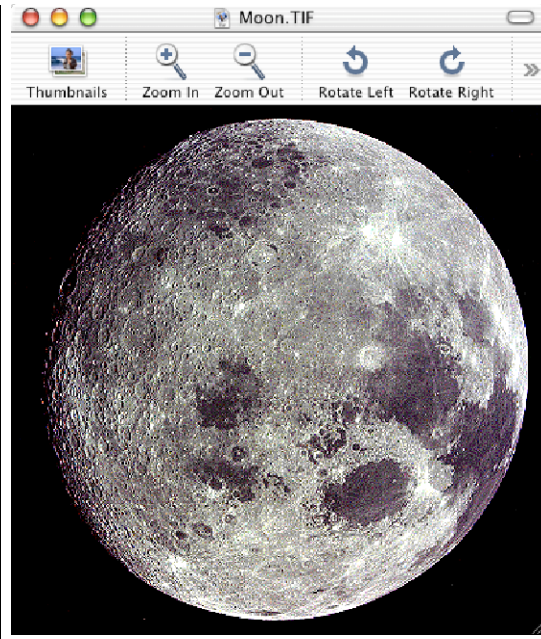


Figure 4.3 Measuring the circumference and diameter of Venus using NIH image

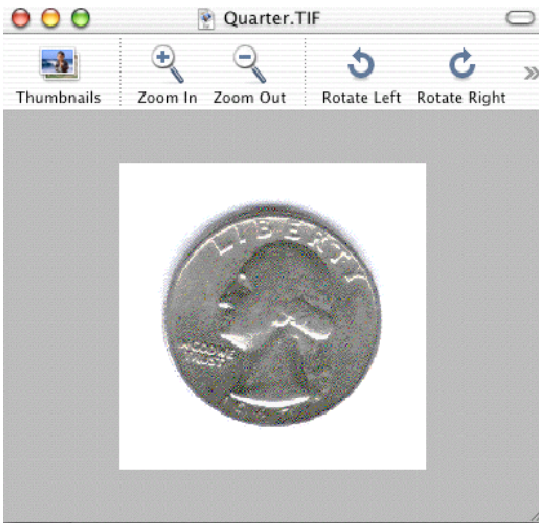
- 2. Student Activity:** Students work in pairs at computers to repeat the measurements of circumference and diameter of Venus.
- 3. Demonstration:** Demonstrate opening additional graphic images



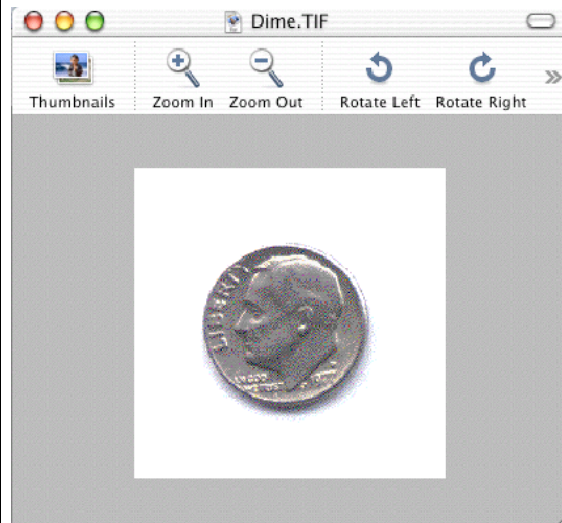
**Earth**



**Moon**



**Quarter**



**Dime**

**4. Student Activity: Students** work in pairs collecting data from at least 20 different images stored in the image file that includes images that they took pictures of with the digital camera.

**5. Closure Questions:**

- How accurate is the measurement in pixels? (depends on the detail of the image)
- How would you find the radius of the objects? (divide the diameter by 2)
- Is there any relationship between the circumference and the diameter like there is between the radius and diameter? (record all student suggestions on overhead)

**Day 4.**

**1. Demonstration:**

- ♣ Set up a spreadsheet that includes the various student ideas of possible relationships – including adding, subtracting, multiplying, dividing the circumference and the diameter. See Figure 4.4 for format.
- ♣ Show how to copy formulas down the list
- ♣ Record the various image labels

**2. Student Activity:**

- ♣ Students enter data and have the spreadsheet compute the relationships. See Figure 4.4 for sample data.

	A	B	C	D	E	F	G
1	What pattern do you see for the relationship of the circumference to the diameter?						
2							
3	<b>Object</b>	<b>circumference [C]</b>	<b>Diameter [D]</b>	<b>C+D</b>	<b>C-D</b>	<b>C*D</b>	<b>C/D</b>
4	Venus	629	200	829.00	429.00	125800.00	3.15
5	Earth	1112	354	1466.00	758.00	393648.00	3.14
6	Moon	1216	387	1603.00	829.00	470592.00	3.14
7	Quarter	493	157	650.00	336.00	77401.00	3.14
8	Nickel	440	140	580.00	300.00	61600.00	3.14
9	Fan	697	222	919.00	475.00	154734.00	3.14
10	Fire Hydrant	681	217	898.00	464.00	147777.00	3.14
11	Bicycle Wheel	895	285	1180.00	610.00	255075.00	3.14
12	Bowling Ball	631	201	832.00	430.00	126831.00	3.14
13							

Figure 4.4 Spreadsheet of circle data. Is there a pattern?

### 3. Closure Questions.

- ♣ What relationship do you find from your data?
- ♣ Once they notice that the circumference is about 3 times the diameter, ask:  
 What does this mean about the circumference and the diameter? If I had a string that was the length of the diameter and a string that was the length of the circumference, can you show me what this relationship means? (3 of the diameter strings is less than the circumference string)

#### Homework:

- ♣ Research pi on the web. What do you find about the relationship between circumference and diameter?

## **TECHNOLOGY STANDARDS FOR STUDENTS**

When you think about the tools that students learn with, you might picture a student at a desk with a pencil, some paper and a book. And, certainly at the beginning of a school year, parents are asked to provide a variety of tools for their children as they prepare for the school year. Paper, crayons, scissors, rulers, pencils, and erasers are typical tools for elementary-aged students; secondary students are more apt to be asked to bring pens and spiral-bound pads of paper along with pencils, erasers, and perhaps a calculator. Schools provide students with tools for learning too. Textbooks are typically handed out for various classes. Some schools have computer-based technologies available as tools for students to use while many others do not. Some students have some of these technologies available in their homes. Others do not. However, learning in schools must include increased access to technologies if students are expected to learn how to learn and solve problems using appropriate technology tools.

For hundreds of years, schools have had the primary responsibility for teaching children to be literate citizens. This literacy has included teaching children reading, writing and mathematics. Concerning writing, education was charged with teaching children to learn to write letters both in print and cursive forms and to arrange these letters into words and sentences. In the process schools have had the primary responsibility for guiding students as they learn to write and communicate with the writing tools of the time. Essentially, schools have been expected to assure that all students can write and communicate using the appropriate technologies of the times.



Schools are expected to teach children to learn to use computer-based technologies as tools “for learning and communications within the context of academic subject areas” (ISTE, 2000, p.17). Thus, with increased access to these computer-based technologies, what it means to be literate, has shifted. This responsibility directs changes in both the tools used to attain this literacy and the curriculum that supports this learning. Students need to learn basic skills with technologies, learn to use technologies in the search for solutions to problems, and learn to use technologies to learn. While some students come to school having had experiences with some of the technologies, schools are expected to assure that **all** students have at least a basic knowledge of using technology for learning and communicating.

In the 1990s technology classes at elementary, middle and high school levels were offered to provide a foundation with technology. Today, fewer and fewer of these classes are available. As writing and communicating with pencils and pens, learning to learn and communicate with technology has become a responsibility of all teachers so that the learning is in concert with learning in the various academic subject contexts. In elementary school, the elementary teacher works with the technology teacher, to design the context in which the students will learn with the technology. Secondary subject specific teachers, too, must consider how students can use the technologies to learn, integrating student with the technology in concert with learning in the subject area.

## **NETS•S: Technology Standards for Students**

Before the school year begins, teachers must consider what technologies they want to be sure that their students are able to use throughout the year. Ultimately, the goal of incorporating technology is to support students in identifying which technology to use as they learn the subject matter. For this goal to be met, teachers must consider how these technologies are introduced to students as well as how they will have opportunities to reinforce their work with the technologies. If students are to learn to identify specific technologies to support their learning of the subject, the critical task for the teacher is to scaffold their learning about the technology within the specific subject matter context. In this way, teachers incorporate technology as an integral component of learning about the subject. And, students have opportunities to learn how to learn with the technology.

Another important concern in a teacher's planning is to consider a variety of ways to integrate technology as a tool for learning and communicating within the context of the specific content. The International Society for Technology in Education (ISTE, 2000) sponsored the development of student technology standards to be used in concert with subject specific standards. From this perspective, teachers need to reconfigure their curriculum and instruction in a way that guides student learning of the subject, the technology, and the technology within the context of the subject. The National Educational Technology Standards for Students (NETS•S) are framed in six standard areas along with clarifying features of the standard. These standards describe a breadth of potential uses for teachers to consider in connecting the curriculum with technology.

## **NETS•S Standard I. Basic Operations and Concepts**

The first standard aims at students' understanding of the basic operations and concepts of technology. Two statements further describe this standard:

- Students demonstrate a sound understanding of the nature and operation of technology systems.
- Students are proficient in the use of technology. (ISTE, 2000, pg. 14)

Teachers cannot expect that students come to their classes with knowledge of the basic operations and concepts of various technology systems or that they are proficient users of technology. This recognition, however, must not be used as an excuse for not incorporating technology in the classroom learning activities. Rather, this recognition challenges teachers to design a curriculum that guide students in learning **about** the specific technology within the context of the curriculum.

As in the *Snapshot of 21<sup>st</sup> Century Teacher's Unit Outline* that began this chapter, the teacher's primary goal was content-specific, requiring students to understand and be able to use the value of pi (the mathematics goal). The teacher arranged student work with a variety of technologies throughout the unit to support them in learning both about the mathematics and the technologies. The demonstration with *Geometer's Sketchpad* was designed as the students' first experience with that software. The teacher planned that the students would observe how to use this sketchpad and some its drawing tools to create a circle; this experience was designed to introduce the students to the sketchpad. As students watch the teacher use the tools to construct the circle, they observe the relationship between two points in a new visual form reinforcing their previous work

with the string and the compass. All three of these technologies are valuable in that they provide multiple and unique representations of the same phenomena. *Geometer's Sketchpad* may prove to be most useful to students as they expand their work with geometric shapes. The focus at this time was to explore creating a circle, paying careful attention to specific characteristics of a circle. Later, in another unit on polygons, they might have an opportunity to experience more of the tools and have hands-on work using the tools to create polygons.

The teacher also designed the unit on circles so that the students could work with the NIH Image software. The students had previously taken digital pictures and learned how to incorporate their digital pictures in this software. For this unit, the teacher planned to use the activity to guide them in measuring specific parts of digital circular images, such as dimes, quarters, moon and Earth.

In other words, for this unit, the teacher had carefully considered what technologies were useful for content-specific goals and students' expanding technology-specific skills. The teacher had earlier incorporated instruction with the basic operations of NIH Image with the intent that during this unit their skills with this technology would be expanded. Also, the teacher used this unit to introduce *Geometer's Sketchpad*, in preparation for future lessons where students would learn more about its basic operations.

The message in this *Snapshot of 21<sup>st</sup> Century Teacher's Unit Outline* is that when students need instruction with the basic operations and concepts of a particular technology, teachers need to consider how to use the curriculum context to teach the

needed technology skills. But, how will you know what your students know about the technology you want to use? Rather than making unsupported assumptions, it is your task to determine your students' readiness to use a particular technology for learning. Chapter 13 of this book will help you in thinking about how to pre-assess your students' readiness for using technology for learning.

Suppose that you are a language arts teacher at the ninth grade level. You are planning to have your students read *The Adventures of Huckleberry Finn* by Mark Twain at the end of the school year. You know that you will want your students to use several different technology tools in that unit to support their learning and communications. You are unsure about their technology skills and abilities with keyboarding and word processing, but you are certain they will need help gaining skills and concepts of some of the other technologies you expect their proficiency by this concluding unit.

How will you make sure that the students are proficient users of the technology for that unit? You begin the year by preparing them! You recognize that reading *The Adventures of Huckleberry Finn* will present difficulties for the students because of unfamiliar dialects and unique approaches to humor. As Twain explains, "in this book a number of dialects are used, to wit: the Missouri negro dialect; the extremist form of the backwoods South-Western dialect; the ordinary 'Pike-County' dialect; and four modified varieties of this last" (Twain, 2001, p. 2). One instructional goal for teaching this novel might be to not only make the dialects accessible to student readers, but to help them see how Twain used language as a literary device in the novel. Remember, you want to use technology when it accomplishes something that you could not otherwise do with more

conventional tools. Use of technology early into this unit would allow access to unique instructional resources while allowing you, as their teacher, to provide your students with an entrance into the technology skills that you will be developing throughout the unit.

**In the Classroom 4.1** requires that students transcribe a conversational speech event that they witness, ranging from a family discussion at dinner to a conversation between friends in the hallway. In this activity, students use a word processing application with either a handheld device or a laptop to write as much of the event as they can capture, including notes about cues, including vocal inflection, visuals, and physical movements between speakers. In class they can share their documents by using the beam feature of the handheld or by storing their document in a shared folder. Or, in a computer lab, they can switch seats with a peer (perhaps only exchanging keyboards), to convert the phrases to more academic or formal English using various tools in the word processor – different colors of fonts, borders, and shades, along with the spelling and grammar tool. The emphasis is on the language arts problem of considering how speakers use diction, dialect, conversational, and academic speech in order to communicate specific, intended meaning. While this activity guides students in learning some basics of the word processor (or perhaps to see what skills they do have with the basic tools), you are maintaining the focus of this lesson on the context of the curriculum.

As noted in the **Technology** description of *In the Classroom 4.1*, this activity focuses on multiple **NETS** student standards (**NETS•S**). **NETS•S I** refers to the learning some basics of word processors as discussed in this section. However, as with almost any activity you integrate in your classes, the activity also meets other **NETS** student

standards – III and IV - to be discussed in further detail later in this chapter. For now, III refers to using technology as a productivity tool and IV refers to using technology as a communication tool.

**In the Classroom 4.1**  
**What did you say and how should I write it?**

**Technology Objectives:** NETS•S I, III, IV

- **Word Processors: Technology as a communication tool and learning basic operations of technology.**
- Keyboarding, spelling and grammar checking, formatting tools.

**Content Objective:** Language Arts: Understand textual features for expressing language in various dialects.

**Problem:** How do speakers use dialect? How does dialect impact how meaning is communicated? How does what we know about oral speech influence how we read dialogue and dialect in a novel?

- o Here are some phrases from Mark Twain’s novel, *The Adventures of Huckleberry Finn*. The novel is written in the first person voice of Huck Finn. Enter these phrases in a word processing document as they are written:

You don’t know about me, without you have read a book by the name of “The Adventures of Tom Sawyer,” but that ain’t no matter. (p. 3)

The Widow Douglas, she took me for her son, and allowed she would sivilize me; but it was rough living in the house all the time, considering how dismal regular and decent the widow was in all her ways; and so when I couldn’t stand it no longer, I lit out. (p. 3)

Well, three or four months run along, and it was well into the winter, now. I had been to school most all the time, and could spell, and read, and write just a little, and could say the multiplication table up to six times seven is thirty-five, and I don’t reckon I could ever get any further than that if I was to live forever. I don’t take no stock in mathematics, anyway. (p. 14)

“Don’t you give me none o’ your lip,” says he. “You’ve put on considerable many frills since I been away. I’ll take you down a peg before I get done with you. You’re educated, too, they say; can read and write. You think you’re better’n your father, now, don’t you, because he can’t? I’ll take it out of you. Who told you you might



meddle with such hifalut'n foolishness, hey? - who told you you could?" (p. 18)

- o Using a different font color, rewrite each phrase using traditional English grammar, punctuation and spelling. Insert your rewritten phrase after the phrase in the word-processed text and then put a box with some shading around each phrase.

Example:

You don't know about me, without you have read a book by the name of "The Adventures of Tom Sawyer," but that ain't no matter. (p. 3)

You don't know me unless you have read a book by the name of "The Adventures of Tom Sawyer," but that does not matter. (my revision)

- o Observe and transcribe a speech event. Listen carefully, perhaps audio-taping different voices so you can transcribe them accurately. Be sure to also note vocal inflections, visuals, and physical movements passing between the speakers engaged in the speech event.
- o Trade your transcription of each phrase with a peer. After reading the transcript, use a different color to, rewrite the phrase in traditional English as you did with those phrases of Huckleberry Finn. Frame each grouping of phrases as you did previously.
- o The final section of this document is your response to the **Problem** that began this exercise. Write your response as if you were explaining the answer to your friends orally – only you will be doing this explanation in writing using your word processor.

## **NETS•S Standard II. Social, Ethical, and Human Issues**

The second standard focuses on social, ethical and human issues when using technology. Three statements clarify this standard:

- Students understand the ethical, cultural, and societal issues related to technology.

- Students practice responsible use of technology systems, information, and software.
- Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity. (ISTE, 2000, pg. 14)

Much of how children learn begins with observation. They observe, they mimic, and implicitly are taught by others' actions, including their teachers. In this manner, teachers implicitly teach students acceptable behavior with respect to scholarly, legal, and ethical uses of technology. Suppose a teacher copies or uses software without paying for it so that students can use that software as a tool for learning. Is that legal? Is it ethical? What do students learn?

If teachers use copyrighted materials for educational uses without identifying the author, they are implicitly teaching their students that copying materials is acceptable. Fair use guidelines under the U.S. Code, Title 17, Chapter 1, Section 107 of The Copyright Act of 1976 allow teachers to use and copy certain copyrighted work for non-profit education uses. One key to the fair use guidelines lies in the "effect of the use upon the potential market for or value of the copyrighted work." Certainly copying an entire, copyrighted document should not be considered legal because making such a copy may affect the potential market for or value of the work. The question remains, however, as to 'how much' can be copied for education uses. This question is a concern for many schools/districts. And, their interpretations can vary widely. Typically, they identify specific policies to describe their interpretation. Teachers must be concerned

both with the Copyright Act and their schools' policies when considering copying. If uncertain, teachers can contact the author for permission. At the very least, the author must be cited in an appropriate manner. Therefore, if teachers copy others' materials from a website, they should (1) assume it is copyrighted material, (2) check with the school/district policy, and (3) identify the author(s) in an appropriate citation.

Schools typically have rules and guidelines for legal and ethical behaviors that are designed to inform students as they use technology. Furthermore, parts of the overall school curriculum explicitly focus on ethical, cultural and social issues related to technology as well as other materials used in learning. Perhaps this explicit instruction incorporates the goal of guiding students in understanding the scholarly, ethical, and legal issues related to technology use. But, these policies and the instruction do not absolve teachers' responsibility for this technology standard. As technology is incorporated throughout the curriculum, attention must be given to this standard, in particular for having students practice responsible use of technology systems, information, and software.

Think about this standard in relationship to designing the Huckleberry Finn Unit. The students need some familiarity with the Mississippi River before reading the novel. So you plan that they are to take an imaginary trip on the Mississippi River and to write a journal of their travels. You require students to use existing interpretations of the Huck Finn story from online resources relating to some aspect of their journey. This activity can integrate social, ethical, and legal concerns when copying materials from the web. You need to plan to encourage the students to look for evidence of authorship for any material

they plan to incorporate. And, you need to require that they provide the appropriate citations either obtained through the website or obtained by personal contact with the creator. In such an activity, students are not only encouraged to practice responsible uses of technology information but perhaps will develop positive attitudes toward technology uses that support their personal pursuits.

### **NETS•S Standard III. Technology Productivity Tools**

The third technology standard for students directs their attention to the use of technology as a productivity tool. Two statements clarify this standard:

- Students use technology tools to enhance learning, increase productivity and promote creativity.
- Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works.

(ISTE, 2000, p. 14)

The idea of technology as a productivity tool engages students in using technology to support them in producing creative works, designing models, and publishing their creative works. Prior to the advent of computer-based technologies, students had few tools to use for producing creative works. Since the late 80s and early 90s word processing programs provided drawing capabilities to allow students tools to illustrate their ideas as they described them. Now, many powerful graphics packages are available to help students produce diagrams and visuals that communicate information far better than in words. With OmniGraffle (a software designed specifically to create diagrams and

charts as a way to organize thoughts visually, documenting thoughts through graphics), students can transfer ideas sketched out in a group discussion to more formally describe their plans for a project. With access to numerous digital images, students can use digital imaging editors like *Photoshop* to enhance or otherwise change the images. Perhaps students may wish to include images of the imaginary people they interview during their trip on the Mississippi River. Selecting and altering images in such digital imaging editors, students can produce a more vivid description of their trip. Also, with access to applications, such as *iMovie*, students can turn digital photos, photographs, video and audio clips into movies as they demonstrate their thoughts in a more creative manner than if they only used a word processor.

The web provides students an environment for searching a tremendous volume of information to identify information that can aid in the solution to particular classroom assignments. This information is certainly more diverse than simply print media since the web provides access to audio and visual clips in support of ideas. Compare this capability with students' opportunities for searching extensive volumes of information in a library.

Such technologies only begin to highlight the wealth of different technologies that are currently available to support students in becoming more productive and creative. What is your role as a teacher in helping students learn to use the various technologies as productivity tools? Certainly, an important task is to continue searching for alternative tools. Technologies are being developed and become available for helping students. Have you had experience with electronic text (e-text) programs like *Microsoft Reader* that

allows readers to annotate and mark up electronic text? Perhaps this tool will help students as they read novels such as *The Adventures of Huckleberry Finn*. The Electronic Text Center at the University of Virginia Library currently has an on-line archive of “tens of thousands” of electronic texts and images with a library service that offers “Ebooks” for the *Microsoft Reader* or the *Palm Pilot* along with access to technologies for the creation and analysis of text materials. Use the Library link described in **Technology Link 4.1** to review this service.

#### **Technology Link 4.1**

Access to the Electronic Text Center at the University of Virginia Library is available by using the Library link at this book’s website.

[www.wiley.com/college/niess](http://www.wiley.com/college/niess)

<http://etext.lib.virginia.edu/>

Certainly you need to help the students become proficient with the basic operations and concepts of the particular technology (NETS•S Standard I). But as the students learn about the basic operations, they can also be learning to use the technology as a productivity tool. It is likely they will learn more about the basic operations and concepts when they use the specific technology in an activity that helps them to be more productive and creative.

What about encouraging students to be more productive and creative in the Huckleberry Finn unit? Preparation might extend to a more interdisciplinary unit while still retaining the language arts focus. Mark Twain lived at time of American history with which the students need to become familiar if they are to understand the context and function of the novel that they will be reading. Humor is a key tool that Mark Twain uses in contrast to the harsh realism of the frontier times. Humor is entertaining and is a colorful way of expressing ideas, whether it is communicated through puns, tall tales, wit, or even satires. The teaching of Twain's novel lends itself well to examination through a variety of perspectives: literary, historical, and social. However, in order to get to the roots of the multiple issues and delights that the text presents, teachers and students need to explore the complex satirical structures which are the framework upon which Twain constructs his social commentary. In fact, when first banned in Concord, MA, it was the satire within the text that incited the attack against a text "whose satire was suitable only for the slums."

*In the Classroom 4.2* suggests how a social studies consideration might be used to extend and support a more interdisciplinary direction by engaging students in developing their own interpretive description of Mark Twain using images of him with accounts of his personality along with an investigation of the reality of the times of his childhood. In the process of interpreting the Mark Twain of the frontier times, students have the opportunity to use technology as a productivity tool through the development of a descriptive essay using a word processor and incorporating graphic images to support

their description. In the process they must deal with social, legal, and ethical issues of copying images from the web.

### In the Classroom 4.2 Who was Mark Twain?

**Technology Objectives:** NETS•S I, II, III, IV

- **Internet, word processing and concept mapping software: Technology as a communication and productivity tool with consideration of ethical issues.**
- Use a web-based search engine to locate, copy and cite appropriately illustrations and cartoon images of Mark Twain and the times in which he lived.

**Content Objective:** **Social Studies:** Develop an interpretive description of Mark Twain, the frontier humorist who wrote *The Adventures of Huckleberry Finn*. Fit this description with information from his childhood years.

**Challenge 1:** Who was Mark Twain?

- ⊖ Locate cartoon images that appeared in *Life* magazine using an Internet search. Can these cartoon images be copied, according to the Copyright Law under the fair use guidelines? Identify at least 3 cartoon images that can be copied and cited. How should they be cited?
- ⊖ Locate Steve Railton's collection of illustrations of Mark Twain using a web search. Determine which illustrations can be copied to your word processed document and the appropriate method for citing these illustrations.
- ⊖ Copy and paste three cartoons and three illustrations and write a short descriptive essay which puts into words the various graphic depictions of Mark Twain.

**Challenge 2:** What were the times like when Mark Twain lived?

Mark Twain was born Samuel Langhorne Clemens on November 30, 1835. He was born in Florida, Missouri and lived in Hannibal, Missouri from ages 4 to 18. His memories of his childhood provided the framework for three stories including that of *The Adventures of Huckleberry Finn*, published in 1885.



- o Where is Hannibal, Missouri? Create a map that shows this town and its surrounding areas using the draw tools in the word processor.
- o What was life like in Hannibal, Missouri during Twain's childhood? Using concept map software, describe Mark Twain's childhood. What influenced his life during the period of his childhood, 1840-1853?

#### **NETS•S Standard IV. Technology Communications Tools**

The fourth technology standard focuses on communicating with technology. Two statements help to explain this standard:

- Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences.
- Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences. (ISTE, 2000, p. 15)

Technology has altered communication. Email and fax have largely replaced letter writing. Responses are expected sooner. Fifty years ago, students developing a project notebook to describe the frontier times on the Mississippi River might have written to the Chambers of Commerce of various towns along the Mississippi River, requesting artifacts from that time period. Today, students can search the websites of the Chambers of Commerce for towns along the Mississippi and even send emails with follow-up requests.

Email has expanded the community of available experts for help on questions. Students could email non-fiction writers who have studied Hannibal during Twain's time, experts on Twain, experts on southern frontier literature and humor, and even students

across the country who are also studying this novel. Another idea might be to connect with student in towns across the nation where Twain wrote to see the kinds of connections between places as well as the ways in which they perceive Mark Twain.

The web offers additional ways to communicate with others, even those in your own class. A class wiki can be used to post ideas on the development of a full-class collaborative document about the novel. Wiki's offer open editing of pages in a website, a potential extension of *In the Classroom 4.2*. In this wiki, students could post their ideas and growing understanding to add to the description of Mark Twain as a humorist. The teacher might consider having the students use the class wiki as a collaborative place to bring together students from across the nation who are working with the novel where they might work with the ideas of the historical context of the novel. Another extension might use the class wiki for the students to collaboratively write a full class essay on a variety of ideas that they have learned about Mark Twain or Hannibal.

A newer form for communication on the web is called a weblog, (referred to more commonly as blog). A blog is a web writing space that can function as an online journal. In the Huck Finn unit, English/Language Arts teachers might use the weblog as a personal reflective space for student readers. Specific prompts might help focus student responses as they read. For example, in the Huck Finn unit, "parody" is an important literary device and concept. Teachers might ask students to respond to the following questions in a weblog post:

- What is a parody? How does Mark Twain use parody in this novel

- How is what Mark Twain does similar to Whitman's preface in *Leaves of Grass*, Wilson's apologetic preface to *Our Nig*, and Hawthorne's parodic preface to *The Scarlet Letter*?
- What current texts can you identify as a parody? How are they similar to or different from Twain's novel?

A more social studies focused activity might direct students in using blogs to reflect on how race is portrayed by Twain through his characters, primarily Huck Finn and Jim, and what Twain was saying about race in the mid 19<sup>th</sup> century world portrayed in the book. Through the students' personal blog postings, they demonstrate their developing understanding of the use of parody in this novel and other, more contemporary texts. Further, because blogs are collaborative spaces, students can post responses to one another's ideas.

### **NETS•S Standard V. Technology Research Tools**

The fifth technology standard focuses on using technology for research. Three statements expand on this standard:

- Students use technology to locate, evaluate, and collect information from a variety of sources.
- Students use technology tools to process data and report results.
- Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks. (ISTE, 2000, pg. 15)

Technology has increased students' ability to conduct research. The web provides access to a tremendous amount of information not traditionally available in school libraries. Now students can search library and electronic text collections from around the world as they research specific topics. More than ever, however, they must learn to carefully cite the works that they do access as well as to evaluate them. Whether these works are valid and reliable is an important question that student researchers must consider in their investigations.

Student research can be an important activity in the Huckleberry Finn unit. One research idea is to involve them in the controversy and question of whether the novel is appropriate for teenagers to read? The novel contains references particular to the practice of slavery, views particular to the reformation, language that is offensive to many, and images that present black characters as little more than laughable. In 1957, the National Association for the Advancement of Colored People (NAACP) charged that the novel contained "racial slurs" and "belittling designations," a stance that has been cited in its banning and controversy for well over the past forty years. However, a 1999 position paper by the National Association for the Advancement of Colored People (NAACP) provides an alternative consideration about the teaching of *The Adventures of Huckleberry Finn*.

You don't ban Mark Twain, you explain Mark Twain! To study an idea is not necessarily to endorse the idea. Mark Twain's satirical novel, *The Adventures of Huckleberry Finn*, actually portrays a time in history – the nineteenth century – and one of its evils, slavery.

With this suggestion, teachers may consider work with the novel as a means of addressing what it means for a book to be offensive and, even banned. Technology can provide a value-added by making accessible resources and information that students might not otherwise be able to access as they consider the question of whether to ban the novel. For this project, students participate in a class-enacted mock trial exploring the banning of the novel in their high school. *In the Classroom 4.3* proposes another interdisciplinary activity involving students in conducting extensive online and textual research into the current ethical, social, and cultural expectations of the society as it might exist in their own community. Additionally, the students must gather data perhaps about other legal cases and national organizations that have addressed the teaching of this controversial novel.

**In the Classroom 4.3**  
**Case #123 The Banning of *The Adventures of Huckleberry Finn***

- Technology Objectives:** NETS•S I, II, III, IV, V
- **Internet, email in search of supporting evidence, *iMovie* or *PowerPoint*: Technology as a communication, productivity, and research tool.**
  - Use technology to search for supporting evidence for presentation at a mock trial that explores the banning of the novel.

- Content Objective:**
- Language Arts:** Students acquire new information and respond to needs and demands of society; students use a variety of technological and information resources to gather and synthesize information and to communicate an analysis of social issues.
- Social Studies:** Students construct reasoned judgments about specific cultural responses to persistent human issues; students examine persistent issues involving the rights, roles, and status of the individual in relation to the general welfare.

**Challenge:** Your task is to enact a mock trial that explores the banning of the novel in a fictional high school in your community. The class will be divided into teams to enact the mock trial where there will be a jury composed of your peers from other class periods, Judge (insert teachers' last name) will make the final ruling.

**Teams and Tasks:**

Each team is expected to prepare evidence and other important artifacts for the trial. They need to select a way to communicate their evidence, perhaps using technologies such as digital cameras, digital video cameras, *iMovie*, *PowerPoint*, *Photoshop*. All teams are expected to work collaboratively sharing information and expectations to support the preparation for the trial.

- Attorneys – prosecution and defense
  - Collect evidence in support of the position
  - Select key arguments that need to be made, citing evidence from the text as well as from real life cases
  - Determine witnesses needed for the presentation

- Organize the presentation of the evidence and arguments
- Witnesses
  - Identify potential witnesses for both the prosecution and defense
  - Prepare a witness statement that outlines the personal perspective and observations
  - Check with the attorneys to determine if other witnesses are needed and, if so, prepare similar descriptive documents to describe the statements and perceptions of that witness. Provide this information to the attorneys who requested the witness
- Jury Members
  - Jury members must come from the local school county. Identify potential jury members. Provide ethnic backgrounds and other background information that may be requested by the attorneys or judge – family, employment, age, experiences in various counties, cultures.
- Enactors
  - Identify the lead attorneys and support personnel to work with the various teams in preparation for the trial
  - Identify potential jury members who might be chosen for the trial; these potential jury members should work with the jury members team to clarify background information
  - Record enactments that will be used in the trial using appropriate technologies

## **NETS•S Standard VI. Technology Problem-solving and Decision-making**

### **Tools**

The sixth technology standard directs the students' use of technology toward problem solving and decision-making. Two statements illuminate this standard:

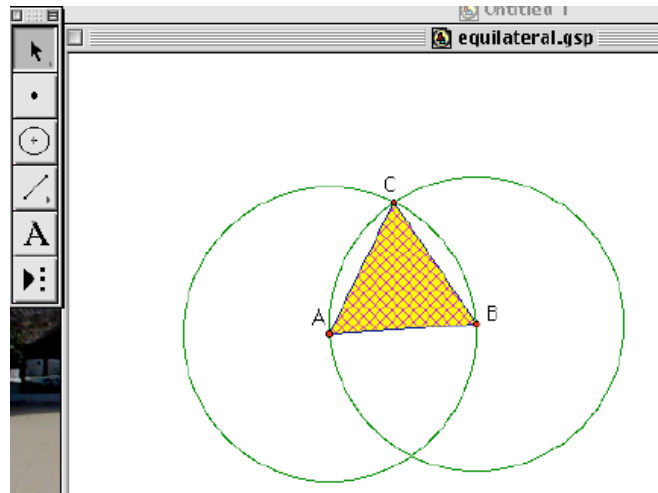
- Students use technology resources for solving problems and making informed decisions.
- Students employ technology in the development of strategies for solving problems in the real world. (ISTE, 2000, p. 15)

The preparation of problem solvers and decision makers is an overarching goal for education. Problem solving requires higher order thinking skills, such as analysis, synthesis or evaluation of knowledge from multiple disciplines. Problems differ from exercises at the end of a chapter primarily because students know that the solution to the problem can be found in the ideas from the chapter. Problems are different from the infamous “word problems” in a mathematics textbook because the primary distinguishing feature from an exercise at the end of the chapter is that the problems are expressed in words; solving these problems can also be done using the information in the chapter. Problems challenge students to think outside a particular chapter or unit, to think more broadly than from within the confinement of the information in chapter or unit.

This sixth standard suggests that technology be one of the tools to support higher order thinking. Simulation software is one type of technology that is often promoted as engaging students in problem solving and decision-making. *SimCity*™ 4, is an example of a simulation that engages students in designing their own city, making decisions about the city budget, size of the population and operation of the city in the face of problems including random disasters, such as flooding, fires, or even twisters.

The *Snapshot of 21<sup>st</sup> Century Teacher’s Unit Outline*, the *Geometer’s Sketchpad* provides a different type of problem solving technology, a drawing pad that students can use to explore mathematical relationships and make conjectures based on these explorations. In this example, they see how to construct an equilateral triangle and then are challenged to construct a regular hexagon (six-sided figure with equal sides).





*In the Classroom 4.3* can be extended to involve students in problem solving and decision making in the unit on *The Adventures of Huckleberry Finn*. As a follow-up to the mock trial, student are challenged to compose letters to the school board addressing other controversial texts, some that they independently research, read and believe should be added to the curriculum. In this problem-based, real-world activity, the students must address a controversial text, develop an argument, and then present their findings to the school board. Technology can be used as a research tool and as a presentation device. Perhaps students could use the class wiki to collaborate and correspond with students in other schools who are reading the proposed controversial novel. A discussion board can be used as a forum for sharing and responding to ideas as they are developed. Students can use email to discuss ideas with authors and others concerned with the specific controversy. The letter to the school board might be accompanied by a *PowerPoint*

presentation of the evidence or a student-designed and created movie (using *iMovie*) providing a debate about the controversial aspects of the proposed novel.

By now you have perhaps considered that many of these activities actually respond to more than one of the **NETS•S** standards, at least in some way. Students constructing a defense to the school board must demonstrate understanding of basic operations and concepts of the technology they use to solve this problem (**NETS•S Standard I**). They must consider the scholarly, ethical, and legal considerations of copying clips or other items from the web (**NETS•S Standard II**). The technology they select for their final presentation to the school board is a productivity tool as it is used to display their argument (**NETS•S Standard III**). In the development of their product, they may use a variety of technologies, including email, the class wiki, and discussion boards to identify and share their developing defense for their specific controversial texts (**NETS•S Standard IV**). They must do some research to develop their argument and much of this research involves the use of various technologies such as the web and email (**NETS•S Standard V**). The idea was posed as a problem requiring that they use appropriate technologies in presenting their solution using tools like *PowerPoint* and *iMovie* (**NETS•S Standard VI**).

Careful consideration of each of these standards along with subject matter standards providing the context require attention in advance of teaching a unit such as have been described for *The Adventures of Huckleberry Finn*. Figure 4.5 displays one way the final unit might be conceived. An important point, however, is that throughout the discussion of the **NETS•S Standards**, there has been an expectation that students

will be prepared for this unit, prepared both for work with the technology as well as for reading the classic novel. Without the technology preparation, the unit might become a unit about technology, which is definitely not the intention.

## Language Arts Unit: *The Adventures of Huckleberry Finn*

### Premise

*You don't ban Mark Twain, you explain Mark Twain! To study an idea is not necessarily to endorse the idea. Mark Twain's satirical novel, The Adventures of Huckleberry Finn, accurately portrays a time in history – the nineteenth century – and one of its evils, slavery.*

*-NAACP, 1999 Position Paper on the Teaching of The Adventures of Huckleberry Finn*

### Standards

#### English/Language Arts

1. Students read a range of print and non-print texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works.
2. Students read a wide range of literature from many periods in many genres to build an understanding of the many dimensions of human experience.
3. Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features.
4. Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.
5. Students use a variety of technological and information resources to gather and synthesize information and to create and communicate knowledge. (National Council of Teachers of English/IRA Standards, 1997)

#### Social Studies

1. Students use experiences to study individual development and identity.

2. Students study people, places, and environments. (National Council for the Social Studies, 1996)

### **Technology**

1. **Basic operations and concepts:** Students are proficient in the use of technology.
2. **Social, ethical and human issues:** Students practice responsible use of technology and develop positive attitudes toward technology uses.
3. **Technology productivity tools:** Students use technology tools to enhance learning, increase productivity, and promote creativity.
4. **Technology communication tools:** Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.
5. **Technology research tools:** Students evaluate and select new information resources based on the appropriateness for specific tasks.
6. **Technology problem-solving and decision-making tools:** Students use technology resources for solving problems and making informed decision. (ISTE, 2000)

### **Resources**

1. PBS Video: Born to Trouble: The Adventures of Huck Finn
2. Internet resources:
  - <http://etext.lib.virginia.edu/railton/huckfinn/huchompg.html>
  - <http://cte.jhu.edu/techacademy/web/2000/kajder/texts/huckfinn/huckintro.html>
  - <http://www.pbs.org/wgbh/cultureshock/beyond/huck.html>
3. Butcher Paper, cards, staples, pens
4. Technology:

- Computer, Internet, class collaborative wiki, weblog account (for each individual student), *Photoshop*, *PowerPoint* or *iMovie/Windows Movie Maker*
- Digital cameras and digital video cameras

### Unit Outline

Time	Activity
2 days	<p>Introduction to the humor of the 19<sup>th</sup> Century: Who influenced Twain?</p> <ul style="list-style-type: none"> <li>• Frontier humor and harsh realism</li> <li>• Puns, tall tales, wit</li> <li>• Who was Mark Twain? <ul style="list-style-type: none"> <li>○ <a href="http://etext.lib.virginia.edu/railton/enam482e/mtassoc.html">http://etext.lib.virginia.edu/railton/enam482e/mtassoc.html</a></li> </ul> </li> <li>• Small group problem: Small groups select and read a range of texts, develop a list of “criteria” identifying the elements of frontier humor. Small groups use the class wiki to post their ideas to a full-class collaborative document. Texts include: <ul style="list-style-type: none"> <li>○ Olmstead’s “Old Willy”</li> <li>○ Twain’s “The Notorious Jumping Frog of Calaveras County”</li> <li>○ Twain’s “How I Edited an Agricultural Paper”</li> <li>○ Additional texts by Washington Irving, James Russel Lowell, Ambrose Pierce, Bret Harte</li> <li>○ <a href="http://etext.lib.virginia.edu/railton/huckfinn/suggs.html">http://etext.lib.virginia.edu/railton/huckfinn/suggs.html</a></li> </ul> </li> </ul> <p>Introduce <i>The Adventures of Huckleberry Finn</i> and the mock trial project:</p> <ul style="list-style-type: none"> <li>• Each student will participate in a class-enacted mock trial exploring the banning of the novel in Hannibal High School, a “fictional” high school classroom.</li> <li>• Technology (PowerPoint or iMovie) will be used to present evidence to the jury.</li> <li>• Teams and their tasks, timelines and technology resources <ul style="list-style-type: none"> <li>○ Attorneys (prosecution and defense)</li> <li>○ Witnesses</li> <li>○ Jury Members</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Enactors</li> </ul>
1 day	<p>Introduction to Parody: Twain’s Distortion of the Preface</p> <ul style="list-style-type: none"> <li>• Examine Whitman’s preface to <u>Leaves of Grass</u>, Wilson’s apologetic preface to <u>Our Nig</u>, Hawthorne’s parodic preface to <u>The Scarlet Letter</u>, and Twain’s anti-preface to <u>Huckleberry Finn</u>.</li> <li>• Students post responses to reflective weblogs.</li> <li>• Begin reading and discussing the novel (Chapters 1-11)</li> </ul>
2 days	<p>Small groups design and create a literary map of the Mississippi, based on Huck and Jim’s journey.</p> <ul style="list-style-type: none"> <li>• Construct a map of the Mississippi River to highlights Mark Twain’s literary and real-life relationship with the river. Begin with a blank map or obtain one from <a href="http://www.loc.memory.gov/ammem/gmdhtml/gmdhome.html">www.loc.memory.gov/ammem/gmdhtml/gmdhome.html</a>; butcher paper, cards, staples and pens available for student use</li> </ul> <p>Assignment: Read chapters 12-18</p>
1 day	<p>Conduct an online “slanguage” search. Is the language and dialect presented within the novel exaggerated? What is its effect?</p>
1 day	<p>Introduction to Satire</p> <ul style="list-style-type: none"> <li>• Read Suess’ <u>Butter Battle Book</u></li> <li>• Examine Horatian and Juvenalian forms of satire and satirical attack.</li> <li>• Identify “satirical elements” in place in <u>Huckleberry Finn</u> (i.e., the tacky grandeur of the Grangerford House)</li> <li>• Examine the illustrations in the text as caricature. Assess the satire within the presentation of Jim, Huck, Pap, and the Widow Douglas. Use online sources to find additional representations of each character.</li> </ul> <p>Assignment: Read chapters 19-31</p>
1 day	<p>In class “read in” of scholarly articles addressing the nature of satire in Twain’s <u>Huckleberry Finn</u>.</p>
2 days	<p>Mapping the literary plot using Kernan’s elements of satire.</p> <p>PBS Video: Born to Trouble – use selected portions to support discussion about satire</p> <p>Assignment: Read chapters 32-43</p>
1 day	<p>In groups of four, design a raft that Huck and Jim could have used to navigate the Mississippi</p> <ul style="list-style-type: none"> <li>• Determine the size of the logs needed to build the raft and how many logs would be needed</li> <li>• Describe the raft, its length, width, and area for Huck and Jim</li> <li>• Use details in the text to support your design proposal, including a potential cost for building this raft</li> </ul>

	<ul style="list-style-type: none"> <li>• Present your proposal for this raft using a <i>PowerPoint</i> presentation that incorporates the language that might be used by Huck and Jim.</li> </ul>
1 day	Develop two visual open minds (using <i>Photoshop</i> ) of the satirist at two selected key moments in the novel.
2 days	Trial preparations. Develop arguments, script scenes, and record enactments or develop evidence using the digital camera, digital video camera, <i>iMovie</i> , <i>PowerPoint</i> and <i>Photoshop</i> . PBS Video: Born to Trouble to support students in working on trial
3 days	Conduct Mock Trial

**Figure 4.5** Unit plan on *The Adventures of Huckleberry Finn* that integrates the NETS Student Standards with the content area standards



## **NETS•S Performance Indicators**

The NETS student standards provide a framework for guiding students in using technology as an integral tool for learning. However, in order for these standards to be more useful, teachers can benefit from more specific performance indicators describing specific performances for various grade levels. The NETS project also included performance indicators of achievement for grades preK-2, 3-5, 6-8 and 9-12 to clarify important student considerations in working toward their technology literacy.

As shown the unit in Figure 4.5, the language arts teacher has made some assumptions about the technology literacy of the students. For the mock trial activity, students are expected to work with technologies such as a digital camera, *iMovie*, *PowerPoint*, and *Photoshop*. The teacher described a time allotted for the trial preparation - only two days - clearly demonstrating this teacher's expectation that students are able to use these technologies without special instruction on the technologies. This expectation is perhaps best reflected in one of the performance indicators for grades 9-12:

Prior to the completion of Grade 12 students will select and apply technology tools for research, information analysis, problem solving, and decision-making in content learning. (ISTE, 2000, pg. 24)

An important note about this particular indicator is that it is identified as an indicator that is in support of technology as a communication tool (**NETS•S IV**) and technology as research tools (**NETS•S V**) but it could have as well been aligned with technology problem-solving and decision-making tools (**NETS•S VI**). What is important about the

performance indicators is that they provide some guidance to teachers in designing the K-12 curriculum in support of working on the six standards categories within the context of learning the subject matter.

Figure 4.6 provides a sample of the performance indicators, specifically the indicators for grades 6-8; a complete set of the performance indicators for the various grade levels aligned with the NETS•S standards is provided in Appendix C. As you investigate these performance indicators to design lessons and units, additional considerations are important. These performance indicators need to be considered within the context of the academic subject areas as well as within the context of your students' technology understanding. In this way, the standards support technology use as “an integral component or tool for learning within the context of academic subject areas” (ISTE, 2000,p. 17).

NETS•S Standards	Prior to completion of Grade 8 students will:
I. Basic operations and concepts	1. Apply strategies for identifying and solving routine hardware and software problems that occur during everyday use. (I)
II. Social, ethical, and human issues	2. Demonstrate knowledge of current changes in information technologies and the effect those changes have on the workplace and society. (II)
III. Technology productivity tools	3. Exhibit legal and ethical behaviors when using information and technology, and discuss consequences of misuse. (II)
IV. Technology communication tools	4. Use content-specific tools, software, and simulations (e.g., environmental probes, graphing calculators, exploratory environments, web tools) to support learning and research. (III, V)
V. Technology research tools	5. Apply productivity/multimedia tools and peripherals to support personal productivity, group collaboration, and learning throughout the curriculum. (III, IV)
VI. Technology problem-solving and decision-making tools	6. Design, develop, publish, and present products (e.g., web pages, videotapes) using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom (IV, V, VI)
	7. Collaborate with peers, experts, and others using telecommunications and collaborative tools to investigate curriculum-related problems, issues, and information, and to develop solutions or products for audiences insides and outside the classroom (IV, V)
	8. Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems. (V, VI)
	9. Demonstrate an understanding of concepts underlying hardware, software, and connectivity, and of practical applications to learning and problem solving. (I, VI)
	10. Research and evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources concerning real-world problems. (II, V, VI)

**Figure 4.6** Performance indicators for technology-literate students in grades 6-8

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The performance indicators do provide guidelines for organizing activities, planning units and lessons, and assessing units and lessons. They are not intended as a script for the lessons and units. You can use these performance indicators in identifying key features of particular activities along with content area performance indicators. As you collect a variety of activities that integrate technology, consider the performance indicators as a guideline for organizing them. In addition to the subject area standards and performance indicators for students at the various grade levels, you might identify particular **NETS•S** standards and performance indicators that reflect the goal for the use of the technology as an integral component for learning in the activity. **Resource Idea 4.1** is one example of how you might describe these ideas as you collect them for future consideration when you design lessons and units.

## Resource Idea 4.1

**Title:** Huckleberry Finn Today

**Content:** English/language arts analysis of a satire

**Grades:** 11-12

### Standards:

- 1. National Council of Teachers of English/IRA Standards, 1997:** Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features.
- 2. National Council of Teachers of English/IRA Standards, 1997:** Students use a variety of technological and information resources to gather and synthesize information and to create and communicate knowledge.
- 3. NETS•S Performance Indicator 10 for grades 9-12, Standards IV, V, VI:** Collaborate with peers, experts, and others to contribute to a content-related knowledge base by using technology to compile, synthesize, product, and disseminate information, models and other creative works.

### Idea:

After reading the novel *The Adventures of Huckleberry Finn* students in small groups are to write and produce a movie set in today's times where Jim and Huck meet and become friends. The movie needs to describe how they would act today. What real-world issues would they confront today? Where would they begin their journey? Where would their journey take them? How might they respond to the confrontations?

Students will use the web to gather information that suggests important issues that might confront Jim and Huck and in which regions of the country these issues might be of particular concern. One group will conduct a survey of the school to identify contemporary issues of importance for teens; a spreadsheet graphical analysis can be used to provide a visual display of the data, highlighting the various ideas. Other groups will contact experts (via email) outside the school to identify potential issues for various regions of the country. A class wiki is used to share information among small groups. A weblog account for each small group supports small groups in synthesizing their ideas for determining current issues that they want to consider in their movie.

When the movies are presented, class discussion is centered on the question of why NOW is an important time to read *The Adventures of Huckleberry Finn*.

**Materials:**

- *iMovie* software for making the movie
- digital camera and camcorder for collecting clips for the movie
- spreadsheet, word processor
- class wiki and individual student blogs
- web and email access

**Modifications:**

1. Students create their movie storyboards sketches with paper. They scan the final sketches and incorporate in a *PowerPoint* to finalize their proposed movie.
2. Students individually write a diary of Huck's adventures in the modern day scene.

**Source:**

PBS's Culture Shock, *Huck Finn in Context: The Curriculum, Section 6 Final Projects*, Retrieved June 27, 2004 from <http://www.pbs.org/wgbh/cultureshock/teachers/huck/section6.html>

As you begin planning your units, you might also consider the standards and performance indicators as a guide in helping you organize the unit in much the same way as you do with the content standards. Review the Huckleberry Finn Unit and consider how the Technology Standards section might be rewritten to incorporate appropriate performance indicators from Figure 4.6.

The performance indicators also provide some directions for the assessments you might use to determine the students' achievements in the unit. The performance indicators, if revised within the unit context, provide specific outcomes for students to

demonstrate. Chapter 13 of this text will provide you with more details in using the performance indicators as you think about student assessment.

You have probably noticed that each performance indicator often reflects more than one standard. But, you also may see that an activity reflects more than one performance indicators. The mock trial activity in the *Huckleberry Finn* Unit is an activity that reflects work aimed at Performance Indicator 8 (in Figure 4.6) where students must select and use appropriate tools and technology resources to accomplish the various assigned tasks in preparation for the trial. However, that activity also reflected work on Performance Indicator 10, where the students needed to research and evaluate which method of presenting the evidence best supports the question of whether to ban the novel or not. Should they use digital camera evidence or would *iMovie* evidence be more persuasive? One technology provides audio along with the video with the capability of displaying the language used in the novel; the digital camera provides the opportunity for close-up stills that might express more graphically a person's scorn.

## **CONNECTING THE STANDARDS FOR A 21<sup>ST</sup> EDUCATION**

Two important considerations are key in beginning the curriculum and unit/lesson planning process: (1) the students and (2) the subject matter. Curriculum content standards have been developed by national organizations for most of the subject areas

that specifically discuss student learning at different grade levels. Four major content areas are typically identified when considering student literacy:

- *Standards for the English Language Arts* prepared by the Association and National Council of Teachers of English. 1997
- *Principles and Standards for School Mathematics* prepared by the National Council of Teachers of Mathematics, 2000
- *National Science Education Standards* prepared by the national Academy of Sciences, 1996
- *Curriculum Standards for Social Studies* prepared by the National Council for the Social Studies, 1994

These standards provide a national perspective suggesting curriculum guidelines for grades K-12 (often broken into grade level groupings such as K-2, 3-5, 6-8, 9-12). Also, the states provide specific guidelines for grades K-12 for each of these content areas. All of these documents provide a starting point for thinking about the content to be taught at particular grade levels. These guidelines suggest the general content that students need to learn in the specific content areas. The grade level organization provides important direction for designing the overall curriculum considering the needs of the students in developing their knowledge in these content areas.

The NETS•S student technology standards and their accompanying performance indicators for the various grade levels explicitly provide additional support for (1) designing sequences of instruction for the various content areas, (2) developing



appropriate sequences of instruction to support students in learning about technology, and (3) preparing for the use of technology as a tool for learning in the content area.

One technique for considering the content areas standards and the NETS student standards and performance indicators collectively is to specifically investigate possible connections with the content area standards. Begin with the subject area standards. Ask yourself questions such as these:

- What technologies can serve as tools for learning this content?
- How can technology serve as a productivity tool, a communication tool, a research tool, or a problem-solving and decision-making tool for learning in this area?
- What preparation will students need in order for these technologies to be tools that support students in learning?
- What social, ethical and human issues need consideration if these technology tools are used in this area?
- What activity will assure that the technology is an integral component for learning and communication within this content area?

Responding to these questions with each of the content standards will help you in seeing the connections of specific grade level content standards and their performance indicators with the NETS•S standards and performance indicators. For each subject matter standard, consider the corresponding performance indicators. Then consider the NETS•S standards in relationship to those performance indicators. Does the technology provide a potential for supporting that indicator? If it does, identify a NETS•S performance

indicator that seems connected. And finally, if you can, think of an instructional example that might be used. Figure 4.7 shows a completed matrix for grade 8 for Language Arts to demonstrate connections that a language arts teacher might consider. You can use **Technology Link 4.2** for access to similar electronic matrices to use as you investigate the connections with subject area standards.

<b>NCTE/IRA English/Language Arts Standards</b>	<b>Example Curricular Performance Indicator (Grade 8)</b>	<b>Corresponding NETS For Students</b>	<b>Example NETS Performance Indicators (Grade 8)</b>
1. Students read a wide range of print and non-print texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works.	Read familiar and independent level text at a rate that is conversational and consistent  Read instructional level text that is challenging yet manageable	Students use technology tools to enhance learning, increase productivity and promote creativity.  (Instructional example: Students read, mark-up and annotate electronic text published within an online repository.)	4. Use content specific tools, software, and simulations to support learning and research.
2. Students read a wide range of literature from many periods in many genres to build an understanding of the many dimensions (e.g., philosophical, ethical, aesthetic) of human experience.	Listen to critically, read, and discuss a variety of literary texts representing diverse cultures, perspectives, ethnicities, and time periods	Students use technology tools to enhance learning, increase productivity and promote creativity.  (Instructional example: Students use graphic	4. Use content specific tools, software, and simulations to support learning and research.  7. Design, develop, publish, and present products using technology resources that demonstrate and

	<p>Listen to critically, read and discuss a variety of literary forms and genres</p> <p>Read, use, and identify the characteristics of workplace and other real-world documents</p> <p><b>Assessment Limits:</b>  Job descriptions  Forms  Questionnaires  Instructional and technical manuals  Other workplace and real-world documents</p>	<p>organizers generated in Inspiration or MS Word to create story maps, plot syntheses, or Venn diagrams used to connect elements of a broad range of texts.)</p>	<p>communicate curriculum concepts to audiences inside and outside the curriculum.</p> <p>8. Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems.</p>
<p>3. Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics).</p>	<p>Draw inferences and/or conclusions and make generalizations</p> <p>Confirm, refute, or make predictions and form new ideas</p> <p>Summarize or paraphrase the text</p> <p>Discuss reactions to and ideas/information gained from reading experiences with adults and peers in both formal and informal situations</p> <p>Select and apply appropriate strategies to make meaning from text during reading</p> <p>Analyze the</p>	<p>Students use telecommunications to collaborate, publish and interact with peers, experts and other audiences.</p> <p>(Instructional example: Students interact with peers and authors within an electronic classroom to conduct literature circles or other interpretive activities and discussions.)</p>	<p>7. Collaborate with peers, experts and others using telecommunications and collaborative tools to investigate curriculum-related problems, issues and information, and to develop solutions or products for audiences inside and outside the classroom.</p> <p>8. Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems.</p>

	relationship between the text features and the content of the text as a whole		
4. Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.	Analyze specific word choice that contributes to meaning and/or creates style  Analyze the appropriateness of tone	Students use productivity tools to collaborate in constructing technology-enhanced models, preparing publications, and producing other creative works.  Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.  Students use technology to locate, evaluate and collect information from a variety of sources.  (Instructional example: Students use digital video or presentation software to create literacy narratives, communicate oral histories, or to present a visual think aloud.)	4. Use content specific tools, software, and simulations to support learning and research.  5. Apply productivity/multimedia tools and peripherals to support personal productivity, group collaboration, and learning throughout the curriculum.  6. Design, develop, publish and present products using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom.
5. Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.	Generate and narrow topics by considering purpose, audience, and form  Select, organize, and develop ideas by exploring and evaluating the	Students use technology tools to enhance learning, increase productivity, and promote creativity.  Student use productivity tools to collaborate in constructing	4. Use content specific tools, software, and simulations to support learning and research.  5. Apply productivity/multimedia tools and peripherals to support personal productivity, group collaboration, and

	<p>usefulness and quality of sources, determining completeness of support, organizing information into sub-topics, generating graphic organizers, outlining, and selecting and using organizational structures appropriate to topic</p>	<p>technology-enhanced models, preparing publications, and producing other creative works.</p> <p>(Instructional example: Students complete a peer review of written essays using commenting features in MS Word and sharing responses by either exchanging disks or beaming if using handhelds.)</p>	<p>learning throughout the curriculum.</p> <p>8. Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems.</p>
<p>6. Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language, and genre to create, critique, and discuss print and non-print texts.</p>	<p>Identify structural, symbolic, and syntactical differences between print and non-print texts.</p> <p>Evaluate a variety of media and their respective means of communicating intended meaning (i.e., advertising, visual art, film).</p>	<p>Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.</p> <p>(Instructional example: students create multimedia presentations using tools such as PowerPoint or Flash to communicate the multiple levels of their understanding through visual and textual means.)</p>	<p>4. Use content specific tools, software, and simulations to support learning and research.</p> <p>6. Design, develop, publish and present products using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom.</p> <p>8. Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems.</p>
<p>7. Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to</p>	<p>Compose for a specific audience and purpose</p> <p>Make effective decisions regarding word choice, style, information provided according to analysis of audience needs and knowledge and consideration of</p>	<p>Use developmentally appropriate multimedia resources to support learning.</p> <p>Use technology resources for problem solving, communication, and illustration of thoughts, ideas and stories.</p>	<p>3. Exhibit legal and ethical behaviors when using information and technology, and discuss consequences of misuse.</p> <p>4. Use content specific tools, software, and simulations to support learning and research.</p> <p>5. Apply productivity/multimedia</p>

communicate their discoveries in ways that suit their purpose and audience.	purpose and form  Maintain organization and coherence with logic, use of transitions, and appropriate details	(Instructional example: Students conduct an I-Search project using multimedia, CD-Rom, and online resources.)	tools and peripherals to support personal productivity, group collaboration, and learning throughout the curriculum.  8. Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems.  10. Research and evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources concerning real-world problems.
8. Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.	Search for information using efficient strategies, keywords and information resources.  Synthesize findings using an organized, clear method that is maintained and developed further through the research process.	Use developmentally appropriate multimedia resources to support learning.  Use technology resources for problem solving, communication, and illustration of thoughts, ideas and stories.	3. Exhibit legal and ethical behaviors when using information and technology, and discuss consequences of misuse.  4. Use content specific tools, software, and simulations to support learning and research.  8. Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems.  10. Research and evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources concerning real-world problems.
9. Students develop an understanding of and respect for	Communicate ideas clearly and concisely to a wide	Students understand the ethical, cultural and societal issues	7. Collaborate with peers, experts and others using

diversity in language use, patterns, and dialects across cultures, ethnic groups, geographic regions, and social roles.	variety of audiences.	related to technology.  Students use telecommunications to collaborate, publish, and interact with peers, experts and other audiences.  (Instructional example: Students correspond with email pals and telementors from other cultures and geographic areas.)	telecommunications and collaborative tools to investigate curriculum concepts to audiences inside and outside the classroom.  8. Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems.
10. Students whose first language is not English make use of their first language to develop competency in the English language arts and to develop understanding of content across the curriculum.	(See sample performance indicators by national standard.)	Students use telecommunications to collaborate, publish, and interact with peers, experts and other audiences.  (Instructional example: Students regularly use English in correspondence and dialogue with other students and telementors.)	7. Collaborate with peers, experts and others using telecommunications and collaborative tools to investigate curriculum concepts to audiences inside and outside the classroom.
11. Students participate as knowledgeable, reflective, creative, and critical members of a variety of literacy communities.	Analyze, interpret and discuss texts.  Critique and offer counter perspectives in an appropriate, precise manner.  Participate in class discussions using a variety of formats (i.e., Socratic seminar, literature circle, kiva discussion).	Students use telecommunications to collaborate, publish, and interact with peers, experts and other audiences.  (Instructional example: Students participate in electronic discussions of literature, peer reviewed writing, film, and other class texts with a broad audience, often including authors or other experts.)	7. Collaborate with peers, experts and others using telecommunications and collaborative tools to investigate curriculum concepts to audiences inside and outside the classroom.
12. Students use spoken, written, and visual language to	Produce effective persuasive writing that establishes	Students use productivity tools to collaborate in	4. Use content specific tools, software, and simulations to support

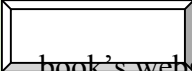
<p>accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).</p>	<p>and maintains a clear, consistent purpose or position, builds upon strategies for generating, searching, and/or gathering supporting information, results from the purposeful selection of an appropriate text structure for development, provides fully developed supporting information, maintains coherence through devices, such as transitions, parallel structures, repetitions, rhetorical questions, uses precise word choice based on audience and purpose, anticipates and answers an opposing persuasive viewpoint, directs persuasive appeals, and enhances text with graphics, such as charts and diagrams (when appropriate)</p>	<p>constructing technology-enhanced models, preparing publications, and producing other creative works.</p> <p>Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.</p> <p>Students employ technology in the development of strategies for solving problems in the real world.</p> <p>(Instructional example: Students create digital videos that present a persuasive argument that calls for social action or community change.)</p>	<p>learning and research.</p>
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Figure 4.7 Connecting NETS•S standards and performance indicators with the Language Arts standards



### Technology Link 4.2

Access to electronic copies of national standards for language arts, mathematics, science and social studies to investigate connections with the NETS student technology

standards and performance indicators is available by using the Standards link at this  book's website.

[www.wiley.com/college/niess](http://www.wiley.com/college/niess)

As you learn about different technologies you can continue to add ideas to the matrices that are of interest for your own teaching. Ultimately, this process helps you become more familiar with the standards and how technology can be used as an integral tool for learning and communication. When you begin to plan units, you will then have had some experience identifying ways that technology can become integral to your students' learning. Again, the important starting point is with the students and what they need to learn in the particular content area. You may even begin to see that how that knowledge is known is shifting with the impact of technology.

With the Huck Finn unit, the language arts teacher was concerned that students investigate topics of literary style (humor in parodic and satirical forms) of a particular author (Mark Twain) in a particular time of American lives (1850-1900). *The Adventures*

*of Huckleberry Finn* provided the environment for a consideration of controversial issues and literary criticism. Then the teacher considered potential strategies for engaging the students in the content (the learners and pedagogy) amid possible tools for guiding their learning (including the potential of technology in supporting learning). While the **NETS•S** standards and performance indicators for technology helped to think about how technology might be used, a primary concern for the teacher was the students (their backgrounds, experiences, and learning needs) and the school (access to various technologies). Yet, the intersection of all of these concerns is what assures that the unit incorporates technology tools at the appropriately level as integral components of learning the content. Teachers using this technology pedagogical content knowledge (TPCK) design lessons and units to enhance students' learning at a time when technology is viewed as a powerful tool with enormous potential for supporting the work, communications, learning, and living in the 21<sup>st</sup> century (ISTE, 2000).

While you may not think that all units should incorporate technology, you need to think about the possibility of assuring that technology is included. Some important questions can be used to guide your thinking about your units.

- What specifically is the focus of the unit and lessons (the subject matter focus)?
- What available technologies might be supportive of learning this subject matter (technology and the subject matter focus)?
- What are the varied learning needs of students as they learn the subject matter (learners and the subject matter)?

- How might these technologies be used to help students learn these key subject matter concepts (technology and subject matter focus)?
- Will the technologies alter how students learn the subject matter (technology and the subject matter focus)?
- How should these identified technologies be integrated in the lessons to maintain the importance of learning the subject matter (technology and subject matter integrated with teaching and learning concerns)?
- How should these technology activities be integrated with other student explorations of the concepts (subject matter and technology integrated with teaching and learning concerns)?
- What skills do students need in advance in order for these technologies to support the learning of the key concepts (technology and subject matter integrated with teaching and learning concerns)?
- How should students' knowledge and understanding of the key ideas of the unit be assessed? Should technology be a component of that assessment (subject matter, technology, and teaching and learning)?

As you consider these questions, the NETS Student Technology Standards provide an important perspective in a consideration of technology as a tool for learning. Chapters 5-10 of this text are designed to expand your knowledge of a variety of technologies and, more importantly, to help you think about using these technologies in a variety of ways that can incorporate the technologies as tools for learning. These varied technology tools can be integral to learning and communications and ultimately be used to

prepare your students for their future where technology is an integral component in their lives, work, and continued learning.

## **Summing It Up**

The 21<sup>st</sup> century requires a preparation of the nation's future citizens in markedly different way than the past. Students today are engaged in a visual, oral, and textual world that calls for a different conceptualization of what it means to be a literate citizen. Schools are expected to respond with changes in both the tools used to attain this literacy and the curriculum that supports this learning. Students need to learn basic skills with technologies, learn to use technologies in the search for solutions to problems, and basically learn to use technologies to learn.

The National Educational Technology Standards for Students (NETS•S) were developed to promote the use of technology as “an integral component or tool for learning and communications within the context of academic subject areas” (ISTE, 2000, p. 17). Six standard areas describe a breadth of potential uses for teachers to consider in connecting the curriculum with technology.

Students must become proficient in the use of technology, recognizing important social, ethical, and human issues that are related to technology use. Students need to learn to use technology as a productivity tool, a tool that while increasing their productivity also promotes creativity. Students need to use technology as communication tools, utilizing a variety of media and formats to communicate information. Students need to have experiences in using technology research tools, using the tools to locate, collect, process, and evaluate data and information in ways that extend their knowledge of the subject matter and that helps them answer important questions. Students need to think in

terms of technology as problem-solving and decision-making tools. As they learn the subject, they need to be involved in experiences where they can use technology for solving real-world problems.

How can students work toward these standards? You, as their future teacher, need to be prepared to guide them in working toward these technology standards. This experience must be framed within the context of their learning of the various subjects asking these questions. What is to be learned and what are the learner's needs? In identifying and designing the curriculum, consider the connection of the NETS•S standards with the subject area standards such as those developed for English/language arts, social studies, science, and mathematics. Connecting those standards with the technology standards as you learn about teaching and learning is an important goal for developing your own pedagogical content knowledge for teaching with technology (TPCK) – the knowledge and skills that go beyond simply teaching subject matter content. You are preparing to integrate how you know your subject matter with your knowledge of the technology and of teaching and learning to prepare literate citizens for the 21<sup>st</sup> century.

## END-OF-THE-CHAPTER ACTIVITIES AND REFERENCES

### Practice Problems

1. Review the Huckleberry Finn Unit, rewriting the Technology Standards section to incorporate appropriate performance indicators from Figure 4.6.
2. Conduct an online search for technology ideas that might be used in guiding student learning while studying the controversial novel, *The Adventures of Huckleberry Finn*. Describe at least one idea using the format in **Resource Idea 4.1**.
3. Search the web to find a resource idea that engages students in using technology as a tool for learning the subject and grade level you plan to teach. Describe your idea using the format in **Resource Idea 4.1**.
4. Select one of the electronic standard matrices from the Standard link identified in **Technology Link 4.2**. Connect the NETS•S technology standards and performance indicators with one grade level in the content area that you plan to teach.
5. Begin your own blog using the instructions in the article by Bull, Bull & Kajder (see Annotated Resources). Use your blog to discuss how the particular technologies you are learning in this course can be used to guide students in meeting the student technology standards.
6. Conduct an online search of wiki's and blogs to identify how these technologies might support learning in your particular subject area. Record your ideas in the format described in **Resource Idea 4.1**.

7. Obtain one of the subject area specific resources described in the Annotated Reference section. Prepare a resource description using the format describes in **Resource Idea 4.1**,

### **In the Classroom Activities**

8. Observe a teacher teaching a lesson where students have hands on access to technology. Describe how the NETS student technology standards are evident in the lesson.
9. Observe a class where the students are using technology in the lesson. How does the technology help them learn the subject?
10. Interview three students in a class where they have just used technology in their lesson. Ask them to explain what they learned and how the technology helped them in learning those ideas. Create an online blog (see Bull, Bull & Kjader in Annotated Resources) to record your summary of how students learn with technology.

### **Assessing Student Learning With and About Technology**

11. Beliefs are the foundation upon which attitudes and behavior are built. This Microcomputer Beliefs Inventory, developed by Riggs and Enochs (1993), provides one way to assess students' beliefs about the use of computer technology in learning. Have several students respond to this survey and compare their responses to your observations of them in a classroom where they are using computers. Discuss how



their results on this instruments matches their verbally stated beliefs about learning with technology.

SA = Strongly Agree

UN = Uncertain

D = Disagree

A = Agree

SD = Strongly Disagree

1	I know how to use the computer	SA	A	UN	D	SD
2	I am always finding better ways to use the computer	SA	A	UN	D	SD
3	If I got better in using the computer, it would help me do better in school	SA	A	UN	D	SD
4	I am not very good at using a computer.	SA	A	UN	D	SD
5	When students' attitude toward math improves, it is often due to their having learned how to use the computer	SA	A	UN	D	SD
6	Even when I try hard, I do not use the computer as well as others do.	SA	A	UN	D	SD
7	I generally use the computer poorly.	SA	A	UN	D	SD
8	Learning how to use the computer well would help me in my classes.	SA	A	UN	D	SD
9	I understand what a computer can do well enough to use them correctly.	SA	A	UN	D	SD
10	My success in school work is related to how well I can use a computer	SA	A	UN	D	SD
11	I know how to use a computer as well as most students.	SA	A	UN	D	SD
12	Learning how to use a computer can help me.	SA	A	UN	D	SD
13	I find it difficult to use a computer.	SA	A	UN	D	SD
14	Learning how to use computer will not help my future.	SA	A	UN	D	SD
15	It is not worth my time to use a computer.	SA	A	UN	D	SD
16	I will probably never use a computer once I leave school.	SA	A	UN	D	SD
17	Given a choice, I would not let the teacher grade me on using the computer.	SA	A	UN	D	SD
18	It is really not necessary to use a computer.	SA	A	UN	D	SD
19	When I have an assignment, which involves a computer, I am usually at a loss as to how to do it.	SA	A	UN	D	SD
20	Computers can be helpful.	SA	A	UN	D	SD
21	I might someday make more money if I learn to use a computer	SA	A	UN	D	SD
22	I feel comfortable when I use the computer.	SA	A	UN	D	SD
23	Most good jobs do not require computer skills.	SA	A	UN	D	SD
24	I do not know how to use the computer well.	SA	A	UN	D	SD
25	Whenever I can, I would avoid using computers.	SA	A	UN	D	SD
26	Success in school has nothing to do with being able to use the	SA	A	UN	D	SD

computer.	
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### **E-Portfolio Activities**

12. Prepare a graph that you can use to chart your students' progress with a variety of technologies as they learn with technologies. Be prepared to scan this document at the end of the course to be included in your E-Portfolio.

### **Reflection and Discussion**

13. Collect from various school districts any written guidelines for legal and ethical technology use. If the schools have computer labs, interview the technology support person. Does any firewall or filtering software to prevent access to specific websites protect the computer systems? If so, what is filtered?

### **Annotated Resources**

Bull, G, Bull, G, & Kajder, S. (2003). Writing with Weblogs: Reinventing Student Journals. *Learning and Leading with Technology*, 31(1), p. 32-35.

Weblogs provide a personal online diary that can be updates on a regular basis.

Construct your own blog using online templates and allowing you to focus on the writing.

International Society for Technology in Education. (2000). *National Educational Technology Standards for Students: Connecting Curriculum and Technology*. Eugene, OR: ISTE.

This document provides technology standards for students along with performance indicators, curriculum examples and scenarios to guide teachers in reconfiguring the curriculum to promote the use of technology as an integral component or tool for learning and communications within the context of academic subject areas.

International Society for Technology in Education. (2002). *National Educational Technology Standards for Teachers: Preparing Teacher to Use Technology*. Eugene, OR: ISTE.

This document presents technology standards for teachers along with performance indicators and model strategies for integrating technology into teaching.

Kajder, S & Bull, G. (2003) Scaffolding for Struggling Students: Reading and Writing with Blogs. *Learning and Leading with Technology*, 31 (2), p. 32-35.

This article discusses weblogs (also called blogs) along with their use in teaching reading and writing. Ten instructional activities describe how blogs can be helpful tools for learning in the classroom. As noted, “Blogs provide a multi-genre,

multimedia writing space that can engage visually indeed students and draw them into a different interaction with print text. Students at all levels learn to write by writing” (pg. 35).

Lee, J. & Molebash, P. (2004). Using Digital History for Positive Change in Social Studies Education. *Journal of Computing in Teacher Education* 20(4), p. 153-157.

This article is an example of social studies teachers learning to use digital historical inquiry methods integrated in their teaching.

Twain, Mark. (2001 reprinting). *The Adventures of Huckleberry Finn*, New York: Modern Library, a division of Random House, Inc.

This American classic novel follows the adventures of a youth, Huck Finn who flees from Pap, his father and the town drunk. The first person voice of Huck tells the intriguing adventures of Huck and Nigger Jim, who is fleeing from slavery, as they pilot their raft on the Mississippi River among dangerous waters, steamboats and people.

Add subject specific articles that describe ideas for teaching with technology – *Learning and Leading with Technology* – provide annotations – get different grade levels and different subject areas.