

Methods of Education Technology: Instructors' Manual



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Methods of Education Technology: Instructors' Manual

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Preface

Methods of Education Technology: Principles, Practice, and Tools, is based on the fundamental idea that effective teaching, with or without technology, is more important than knowing many tools. For this reason, all technology uses in the text are grounded in standards, principles, and research, and much of the text focuses on pedagogy before technology use. For readers who are familiar with engagement, critical thinking skills, and effective instruction, this text provides a useful overview. For those who are new to teaching, this text provides support not only for using technology in classrooms but for understanding when, why, and how to do so.

Much of this text was previously published by Pearson as *Supporting Learning with Technology: Essentials of Classroom Practice* (Egbert, 2009). In 2016, copyright was released and permission granted by that publisher to revise the text. (However, copyrights to screen shots and other information in the text are not released and may not be revised without consent; they must have the copyright information attached in any remix, revision, or adaptation.)

Although many of the references in the chapters have been updated and added to the reference lists of each chapter, the lists still contain many of the original references so that teachers not only can see how things have changed over the years but can also refer to those resources that they see as still useful. While much about the technologies in the text has changed, little about the principles of learning and the need for 21st century skills has. Therefore, we have removed many of the references to tools from the main text and Susan Skavdahl has created a new Teacher Toolbox that can be added to and updated as needed. I thank Susie for her hard work both on the Toolbox and the Instructor's Guide.

We hope that by making this an open resource that it will be accessible to more teachers and serve as a resource for many years to come. Please feel free to contact us through jegbert@wsu.edu.

Joy Egbert

August 5, 2017

I

PART 1

CHAPTER 1 INSTRUCTOR'S GUIDE

The instructor's guide contains several useful tools, discussion questions, a case study, review questions, additional chapter assignments, lesson examples and a student application assignment. Chapter 1 also contains the Lesson Analysis and Application Worksheet, referred to in each of the chapters. As the Instructor, pick and choose which of these materials work for you or you may decide to use our ideas and create your own. This guide is intended to help solidify the information from the chapter and help you as an instructor implement the application of these materials.

Discussion questions

The following questions are intended for use in a small group discussion setting. Please use these questions to help the students understand the important concepts in this chapter. To add interest to class discussions, copy and paste some or all of these questions into a Nearpod <https://nearpod.com> or PowToon, <https://www.powtoon.com>, to create a fun, user-friendly, student-voice based, review.

1. Define what technology in the classroom means to you. Why is it necessary to learn to use technology, as a classroom tool?
2. When considering technology as an educational tool, what role do you think it should play in your future classroom?
3. Put your creative thinking hats on, what is educational technology to you, how can it enhance creative thought?
4. Please discuss 4 educational technologies that you know about or have used in the classroom in the past.
5. Look at the National Education Technology Standards (NETs) located in your text. Discuss how 2 of these standards can be used to help you use technology to teach a math or science lesson.
6. Think about the different groups of students you might have in your classroom. List 3 areas and discuss where technology would benefit special needs and ELL students.
7. How can online website research contribute to a positive classroom experience? Do you see yourself using the websites and apps with your students? If so how?
8. Brainstorm In your small groups:
 - Discuss some of the changes you've seen when considering the use of technology in the classroom since you were in elementary school.
 - What technological changes do you expect to see in the future? How do you see these changes affecting the classroom?

Case: Balancing Act

As you read the following scenario, think about what teachers need to know in order to support learning

with technology effectively.

"Let's discuss why you're taking this class," said Dr. Ritter on the first day of her education technology class for pre-service teachers. "What do you think teachers need to know about supporting learning with technology, and why do they need to know it?"

She wrote "What" and "Why" at the top of the whiteboard at the front of the room.

"I don't know why we need to take an ed tech class," lamented Barbara, a first-semester pre-service teacher. "I've been using computers since I was 4. We don't have a class that just talks about using books, do we?"

"Interesting point. Can you put that in a form that I can list here, please?" Dr. Ritter replied.

"Oh, okay," said Barbara. "Under 'Why' you can write: so they know why they need to know." As the class laughed, Dr. Ritter smiled and asked, "What do others of you think?"

"Well, I can say that I use computers every day," said Josh. "But I don't really know how to use them in a classroom except for writing and maybe sending email to someone. So I need to know how to use them with students."

Dr. Ritter wrote, "How to use computers in the classroom" under "What" on the board.

Brittany added, "There's a lot of software and other technologies out there that I have never used. So I need to know more about technical stuff. But how can we learn everything in one course?"

Dr. Ritter said, "Good question—we'll need to answer that one" and wrote "Technical stuff" under "What."

The conversation continued for several more minutes. When the students ran out of ideas, the short lists on the board looked like this:

What Why

- How to use computers
- To meet state requirements in the classroom
- Because we have to
- Technical stuff (all of it)
- To meet student standards
- What's available
- To keep up with students
- What's required/expected
- To have an edge in job searches

- The best software and activities
- Exactly what to do

“Those don’t seem like very strong reasons for you to spend 5 hours per week in class for a whole semester, do they?” said Dr. Ritter. “There must be additional whats and whys that we haven’t considered yet. Let’s think about the questions in another way.”

She displayed a PowerPoint slide on the screen in the front of the classroom. On it was written:

Teaching is not a science; it is an art. If teaching were a science there would be a best way of teaching and everyone would have to teach like that. Since teaching is not a science, there is great latitude and much possibility for personal differences. (George Polya, cited in O’Connor & Robertson, 2002)

“What do you think this quote has to do with the reasons you’re here?” she asked.

Case Review Questions

Answer these questions about the case with your current level of knowledge. There are no right or wrong answers to this chapter preview—the goal is for you to respond before you read the chapter. Then, as you interact with this chapter’s content, think about how your answers might change.

1. What would you add to the lists the class made? Why?

2. What does the quote from Polya have to do with learning about educational technology?

3. What role(s) do you believe technology should play in education? Why?

4. What are your goals in taking this course? What do you hope to accomplish?

The questions from Dr. Ritter help to set the tone for the rest of her course and stimulate her students’ previous knowledge so that they can make connections between what they know and what is to come in the course, as this chapter does for the rest of this text. As mentioned above, this text focuses on foundational, or essential, ideas for effective technology-enhanced learning and teaching. More specifically, this chapter will help you to understand how technology has been defined and why it has become such an important educational topic. The chapter also discusses some initial fears that you may have as you begin to integrate technology into your teaching, as well as benefits and barriers to using technology. Additionally, examples of tools and activities provide an overview of what is happening in today’s classrooms. Refer to the Teacher Tools section in this chapter for a list of websites and ideas.

Chapter Review Questions

Following each chapter's case is a list of objectives that you should be able to meet after completing the chapter. For example, when you finish this chapter, you will be able to meet the following objectives:

- Explain why a learning focus is important to supporting learning with technology.
- Describe the relevant standards and the 21st-century skills that ground the learning in this text.
- Define “educational technology” and related terms.
- Discuss the use of technology tools to provide access to learning for physically challenged students, English language learners, and others who might face barriers to learning.
- Present an overview of computer-based and computer-assisted assessment practices.
- Understand how and why to adapt lesson plans for more effective learning.

ISTE Standards for Teachers

The format, content, and objectives for each chapter have been developed to help you to meet the National Educational Technology Standards for Teachers (NETS*T). These include:

1. Facilitate and inspire student learning and creativity.
2. Design and develop digital age learning experiences and assessments
3. Model digital age work and learning
4. Promote and model digital citizenship and responsibility
5. Engage in professional growth and leadership

ISTE standards https://www.iste.org/docs/pdfs/20-14_ISTE_Standards-T_PDF.pdf

-Look at the objectives for this chapter listed above. Which NETS*T do they address, at least in part?

-Which of the five learning goals are you confident that you know how to support? Which do you need more work with? Why do you think so?

-What is your theory of how people learn? How does your personal theory affect how you plan to teach?

-What are your reasons for learning about educational technology?

-What do you remember about using technology when you were K-12 student? What ideas do you already have about using technology in your instruction?

-What else would you add to this list?

-What might be some of the barriers to learning for the students you plan to teach? Ideally, how could technology help overcome these barriers?

-Being media literate requires that the students understand the source of their information. How can understanding the parts of a URL aid in this understanding?

-Have you ever witnessed or participated in a thoughtless use of technology? What did you learn from the experience?

-Based on you reading of this chapter, what else would you change about this lesson?

-Which information in this chapter is most valuable to you? Why? How will you use it in your teaching?

TECHNOLOGY-SUPPORTED LESSON EXAMPLE

Chapters 2-8 include a lesson section that has three parts: (1) a sample technology-enhanced lesson, (2) a lesson analysis, and (3) suggestions for adaptation to better fit the classroom or situation addressed in the case. Each sample lesson is written by a classroom teacher and is tied to the chapter's topic. Each chapter's lesson is chosen because it demonstrates ideas from that particular chapter. This section not only shows how the chapter concepts fit together but also demonstrates how technology-enhanced lessons created for one context might be adapted to work effectively in another context. Note that any adaptation must be based on who the students are, the teacher's experience and knowledge, and the context (available technology, support structure, curriculum, and so on).

This chapter explores an example of a lesson developed for grades 5-7 that is being adapted for grade 3.

The Lesson

Following is a plan on current events from <http://www.teacherplanet.com/content/sites-teachers?ref=sites4teachers>. Note that the lessons in other chapters might follow different formats because there is not one right way to create a lesson plan, and teachers usually personalize their lessons in some way. However, certain elements such as objectives, goals, materials, and procedures will almost always be present and can be analyzed for appropriateness.

Source: Reprinted with permission of The Montana Standard.

Analysis

The lesson in each chapter is analyzed according to the categories from the following Lesson Analysis and Adaptation Worksheet. The first column contains criteria for an effective lesson. Indicators (explanations) of the criteria are in the middle column. The third column in the worksheet is for teacher comments about whether and how the lesson meets each criterion and, if it does not, how the lesson might be adapted.

From the analysis, it is clear that the lesson has some good aspects. However, a number of areas can be improved or changed to work better in general and for third graders specifically. Following are some adaptations that could be made to this lesson based on the analysis.

Adaptations

A synthesis of the comments on the worksheet indicates that to work better for the range of third graders in any class, these adaptations could be made:

1. Make the standards explicit and tie them to the objectives and tasks. Common Core Standards could include those addressing media and technological literacy, thinking skills, current events, and reading and writing.
2. Include handouts for reading strategies. Content reading strategies such as predicting and inferencing could be addressed by having students complete a handout for each article. The handout would provide scaffolding and help students focus their reading. The handout could include simple questions such as:
 - “What do you already know about this topic?”
 - “What does the title mean?”

Current Events Awareness

An Educator's Reference Desk Lesson Plan

Author: NIE Curriculum Guide—The Montana Standard—Butte, MT.

Grade Level(s): 5, 6, 7

Subject(s):

- Social Studies/Current Events/Issues

Objective: To increase student awareness of current events at local, national and international levels

Materials Needed: Newspapers, scissors

To Start:

Ask students to recall some of the biggest local news events of the year. Can they do the same for national news? World news? Which stories affect them directly (teachers' strikes, park closings, etc.)? Which stories affect them indirectly (world hunger, rising oil prices, etc.)? Which stories do not affect them at all?

Group Activity:

Divide the class bulletin board into three categories: local, national, and world news. Break the class into three groups, one for each category. Every day for a week or so, have each group clip from the newspaper two or three articles and photos they feel are most important or interesting. Each group should arrange its examples on the bulletin board.

At the end of the week, have students report on one of the events pictured on the board. The oral reports should include the 5Ws and H—the who, what, when, where, why, and how of the story—as well as why the group felt the event was important.

Follow-Up:

When a major local, national, or world news story breaks, bring it to the class' attention; challenge students to find follow-up stories in the days that follow. Have them summarize events that have occurred. Story examples might include natural disasters, political crises, major crime investigations, disease outbreaks, organ transplant operations, etc. (Note that as the days go on and the story becomes less timely, it may be harder to find follow-ups. You might make the assignment a challenge: Who will be the first to uncover the news?)

Lesson Analysis and Adaptation Worksheet

Content Area/Topic: Current events/News

Location and Title of Lesson: <http://www.sites4teachers.com/>, Current Events Awareness

Intended Audience for the Adaptation: 3rd grade

The lesson . . .	Indicators	Comments
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Works toward appropriate goals.	<ul style="list-style-type: none"> • Content and technology standards are mentioned. • Standards are for the correct grade level and content area. • Objectives are aligned with standards. • Tasks focus clearly on obtaining the objectives. • Students are asked to do more than memorize or understand (e.g., summarize, synthesize, predict, etc.). 	The goal of increasing student awareness is stated, but the standards are not. These need to be listed for grade 3 and tied to the objectives and tasks.
Requires the use of higher-order thinking skills and “new” literacies.	<ul style="list-style-type: none"> • Media, visual, communicative, technological, mathematical, and/or other nontraditional literacies are addressed. 	The lesson includes summarizing, some synthesizing. It could easily include predicting and other literacy skills. For third graders, visual literacy is important and there should be a segment about WHERE they got the story and why they believe it. It doesn't have to be in depth but should raise awareness.
Integrates the learning goals.	<ul style="list-style-type: none"> • Communication • Production • Critical thinking • Creativity • Content • Problem-solving • Inquiry/research 	It includes one-way communication and simple production but needs to integrate research, critical thinking, and content learning more.
Includes a variety of resources.	<ul style="list-style-type: none"> • Students have choices of materials at different levels. • Materials are available in a variety of modes (e.g., graphics, sound, text, video) and media (e.g., books, films, photos, computer). 	The resources need to be made explicit—is it <i>USA Today</i> and the local paper or something else? Reading levels differ, and using online papers and magazines made specifically for students would help more students have choices and include other types of news like video reports.
Engages all students actively in authentic tasks.	<ul style="list-style-type: none"> • Students have roles/tasks to perform throughout the lesson. • Connections are made between the task and real life. • Students must actively search for answers to essential questions. 	There are groups but no specific tasks. Students need to be given some recommendations here. It's too easy for one or two students to control this task. A general connection is made at the start of students' lives but not carried through. More specifics could help form an essential question.

Uses technology effectively, efficiently, and as a learning tool.	<ul style="list-style-type: none"> • The technology makes the task more authentic. • The technology makes the task easier to accomplish. • The technology helps students learn faster than without it. • The technology is secondary to the content and goals. 	Technology is not used. Students could print news from many different sources from the Internet and thereby get a much broader picture of each event. Saves the teacher time from trying to get enough newspapers and gives students more options, especially for the follow-up stories.
Addresses the needs of a variety of students, including ELLs and students with physical and other challenges.	<ul style="list-style-type: none"> • All students can access task instructions. • All students can access task materials and resources. • Students have different ways to accomplish the same objectives. • Assessment is aligned to the standards and objectives. 	Not all students can read a newspaper. Using the Internet to find a variety of levels of news would help these students access the lesson content. Also, instead of an oral report at the end of the week, students should be allowed to draw, graph, or whatever else they need to do to show their understanding. A class journal might work, too.
Includes appropriate assessments.	<ul style="list-style-type: none"> • Assessments are fair for all students and not based on one ability (e.g., writing). • Assessments allow students to show what they know/can do rather than what they cannot. 	No real assessment is mentioned. It needs to be made explicit and tied to the standards/objectives. Adding choices for presentation would also make the assessment fairer.

- “What do you think will happen next?”
- “Is the source trustworthy?”
- “What did you learn about this topic?”

This could lead to great discussions around media literacy, content learning, and personal experience. In addition, this could give each student a task that the teacher could assess.

Include a greater variety of resources. Third graders, like all students, vary greatly in reading and thinking skills and preferred learning strategies, so materials at a number of levels should be available. The Internet can help by allowing students to access Time for Kids, CNN Online, local news in repeatable video clips, and so on. This allows students with a variety of challenges to participate and work toward the same goals.

Include specific, differentiated assessment. Third graders cannot always explain in text what they want to say. They should have the option of using other modes (e.g., speaking or drawing) to present their

stories, but a rubric should be included that evaluates all of the presentations on the same criteria tied to whichever standards the lesson is based on. Depending on these standards and the related outcome goals, sample categories could be completeness, expression, explanation, ability to answer questions, and use of technology or other aids.

These four important changes make the lesson content more relevant, more consistent, and focused on language and content standards that are easily integrated into the third-grade lesson topic. Just as important, incorporating the use of technology makes all of these goals possible.

CHAPTER EXTENSIONS

Adapt

Choose a lesson for your potential subject area and grade level from the Lesson Plans Library at Discovery Schools (<http://www.discoveryeducation.com>). Use the Lesson Analysis and Adaptation Worksheet to analyze the lesson. Use your responses to the worksheet to suggest general changes to the lesson based on your future students and context. Use the Lesson Analysis and Adaptation Worksheet to analyze the lesson. Use your responses to the worksheet to suggest general changes to the lesson based on your future students and context.

Practice

These activities will allow you to apply the ideas from the chapter and use your understandings of the foundations of technology use.

1. Map the standards. List the 6 learning goals for this text in a table. Use the Education World Web site (<http://www.educationworld.com/>) or <http://www.educationworld.com> common core to find standards for your specific grade and content area. Put each standard under one or more of the learning goals. What did you find?
2. Think about technology. List the ways in which you interact with technology in a typical day. What does this technology interaction imply about what students need to do in real life with technology?
3. Outline your personal teaching philosophy. What do you believe education is and can do? How do you believe learning happens? Why?
4. Explore literacy needs. Explore a piece of software or a Web site from a multiliteracy viewpoint. Which literacies listed in this chapter do students need to employ to use the software you chose? How will you teach them?
5. Find an example. Using one of the Web sites mentioned in the chapter or one you find yourself, find a real-life example of classroom technology use. State whether the use might be effective or not and explain why you think so.
6. Examine task characteristics. Using the characteristics of effective tasks outlined in this chapter, examine one of the classroom examples provided in the Learning Activities section. Explain how it has or does not have these characteristics.

Explore

These activities will help you to explore possibilities outside the chapter.

1. Interview a K-12 student. Think about what students in a specific grade and/or content area need to know about technology and technology use. Prepare questions ahead of time to discover what your student knows about technology. Prepare a summary of the interview to share.
2. Interview a K-12 teacher. Find out what technologies are most useful for the teacher and what else he or she would like to know about technology and learning.
3. Make a list. Research information on students with special needs from the DO-IT Web site (<http://www.washington.edu/doiit/>) or conduct a Web search. List some of the needs that students in your future classes may have. List any other kinds of differences that you may find in children in your future classes that could affect both learning and technology use.

Lesson Analysis and Adaptation Worksheet

Content Area/Topic: Location and Title of Lesson:

Intended Audience for the Adaptation:

The lesson . . .	Indicators	Comments
Works toward appropriate goals.	<ul style="list-style-type: none">• Content and technology standards are mentioned.• Standards are for the correct grade level and content area.• Objectives are aligned with standards.• Tasks focus clearly on obtaining the objectives.	
Requires the use of higher-order thinking skills and “new” literacies.	<ul style="list-style-type: none">• Students are asked to do more than memorize or understand (e.g., summarize, synthesize, predict, etc.).• Media, visual, communicative, technological, mathematical, and/or other nontraditional literacies are addressed.	
Integrates the learning goals.	<ul style="list-style-type: none">• Communication• Production• Critical thinking• Creativity• Content• Problem-solving• Inquiry/research	
Includes a variety of resources.	<ul style="list-style-type: none">• Students have choices of materials at different levels.• Materials are available in a variety of modes (e.g., graphics, sound, text, video) and media (e.g., books, films, photos, computer).	

Engages all students actively in authentic tasks.	<ul style="list-style-type: none">• Students have roles/tasks to perform throughout the lesson.• Connections are made between the task and real life.• Students must actively search for answers to essential questions.
Uses technology effectively, efficiently, and as a learning tool.	<ul style="list-style-type: none">• The technology makes the task more authentic.• The technology makes the task easier to accomplish.• The technology helps students learn faster than without it.• The technology is secondary to the content and goals.
Addresses the needs of a variety of students, including ELLs and students with physical and other challenges.	<ul style="list-style-type: none">• All students can access task instructions.• All students can access task materials and resources.• Students have different ways to accomplish the same objectives.
Includes appropriate assessments.	<ul style="list-style-type: none">• Assessment is aligned to the standards and objectives.• Assessments are fair for all students and not based on one ability (e.g., writing).• Assessments allow students to show what they know/can do rather than what they cannot.

Student Application Activity

The following questions are intended to help the students go beyond what they have read and apply the information from the chapter. After reading chapter 1 they will have a broad overview of some of the technologies available in the classroom. By completing the following assignment students will have the opportunity to look more deeply into ways in which technology can affect education and the world around us.

Instructors, please divide the class into small groups and follow the directions below to complete this assignment.

Group 1

Please watch this Ted Talk that describes multitasking and how it affects us. <https://youtu.be/PriSFBu5CLs> *Links to an external site.*

After viewing the video please respond to the following questions

1. How does this speaker define multitasking?
2. In this Ted Talk, discussing multitasking, what are some of the conclusions?

3. In your opinion, do you think people can be successful at multitasking? Do you think you are successful at it?
4. What are some things that are amenable to multitasking? When is it dangerous or harmful to multitask?
5. Please write a short paragraph discussing why you feel that you are successful or unsuccessful at multitasking. How is multitasking related to the use of technology?
6. Be prepared to discuss the video along with your findings with the class.

Group 2

Please watch this Ted Talk, discussing the use of technology in education.

<https://youtu.be/w6vVXmwYvgs> **Links to an external site.**

After viewing the video please respond to the following questions

1. What is the premise of this video? What is this instructor encouraging us to do as educators to change how technology is being used in the classroom?
2. How can technology be used as a purposeful and effective tool in the classroom?
3. What does it mean to have a “students teaching students” classroom? Describe how you might use Genius Hour, described in the video.
4. Write a short paragraph describing how you might make your classroom technology, user-friendly, using students cell phones, apps, and websites.
5. Please look up the ISTE National Education Technology standards (NET’s), how does understanding the use of technology help your students?
<https://www.iste.org/standards/standards/for-students> (Links to an external site.)
<https://www.iste.org/standards/standards/for-educators> (Links to an external site.)
Looking at the standards as they relate to teaching, do you think that technology can enhance how you teach?
<https://www.iste.org/standards/standards/for-students> (Links to an external site.)
6. Be prepared to discuss the video along with your findings with the class.

Group 3

Please watch this video, discussing the use of drones in the military.

<https://youtu.be/ZgCv3tHI9pQ> **Links to an external site.**

After viewing the video please respond to the following questions:

1. How are drones being used in the military?
2. Are drones helping the military accomplish its mission? If so how?
3. How are drone pilots being trained?
4. How is the military using video games to combat Post Traumatic Stress Disorder? (PTSD) <http://www.complex.com/life/2016/11/veterans-day-millennials-video-games-ptsd> (Links to an external site.)
5. Please look up the ISTE National Education Technology standards NET’s, How can the use of drones help students understand the connection between the classroom and a future career? How does that relate to the NET’s standards? <https://www.iste.org/standards/standards/for-students> (Links to an external site.)
6. Be prepared to discuss the video along with your findings with the class.

Group 4

Please watch this video, discussing video game addiction in South Korea.

https://youtu.be/Lzn1_i42HSA Links to an external site.

After viewing the video, please respond to the following questions:

1. Please describe the video gaming problem in South Korea, how does it affect the video game players and their families?
2. What does it mean to be an addict?
3. Do you think this is a new problem or has it been around for a long time?
4. Do you see the same issue in the US? Why or why not?
5. How do you think you as an educator can create an atmosphere of ethical responsibility when using technology in the classroom?
6. What are your thoughts regarding this short documentary and video game addiction?
7. Be prepared to discuss the video along with your findings with the class.

Group 5

Please watch this video that describes video game use in education.

<https://youtu.be/6J9vfcW3e8Q> Links to an external site.

After viewing the video, please respond to the following questions:

1. How is video gaming used in education?
2. How is this computer education instructor using video games in the classroom? Do you think this use of games is helpful in education? Please list two pros and cons of classroom video gaming.
3. Take a look at the website, <https://blizzcon.com/en-us/> (Links to an external site.)Links to an external site. How does this entertainment company use video gaming? What are your thoughts?
4. Discuss your findings, what you observed in the video and your, personal, opinion of video games in education.
5. Please list the 5, 21st-century skills, found in the text. Which of these skills apply to a gaming? Please explain.
6. Be prepared to discuss the video along with your findings with the class.

Group 6

Please watch this video that describes the use of Minecraft in Education.

<https://youtu.be/SSimHPmZ0hA> Links to an external site.

After viewing the video, please respond to the following questions

1. How is Minecraft Edu, <https://education.minecraft.net> (Links to an external site.)Links to an external site. being used in education?
2. Please describe how Minecraft Edu is used in a variety of content areas?
3. Please list 2-3 pros and cons to using Minecraft Edu in the classroom.
4. Please list the 5, 21st-century skills, found in the text. Which of these skills apply to a game like Minecraft? please explain.
5. Discussing your findings, describe what you observed in the video and your personal opinion of using Minecraft Edu in the classroom.
6. Be prepared to discuss the video along with your findings with the class.

Group 7

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Please watch these two short videos that discuss the use of future technology in the classroom.

<https://youtu.be/uZ73ZsBkcus> Links to an external site.

https://youtu.be/loFL5gT_m8I Links to an external site.

After viewing these videos, please respond to the following questions

1. What does the future of technology in education look like?
2. How is the instructor in the first video using technology to enhance student learning? Is this realistic? Why or why not?
3. What do you think the biggest change in technology will be, based on the text?
4. The text and the video discuss the use of augmented and virtual reality, please describe each of these technologies.
5. When considering the information regarding educational technology, found in the text, how will **assessment, context, effectiveness, engagement, evaluation, and feedback** play a role in the future of educational technology?
6. Discuss your findings, what did you think of the video and the future of technology in the classroom?
7. Be prepared to discuss the video along with your findings with the class.

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CHAPTER 2 INSTRUCTOR'S GUIDE

INSTRUCTOR'S GUIDE

The instructor's guide contains several useful tools, discussion questions, a case study, review questions, additional chapter assignments, lesson examples and a student application assignment. Chapter 1 also contains the Lesson Analysis and Application Worksheet, referred to in each of the chapters. As the Instructor, pick and choose which of these materials work for you or you may decide to use some of our ideas to create your own. This guide is intended to help solidify the information from the chapter and help you as an instructor implement the application of these materials.

Discussion questions

The following questions are intended for use in a small group discussion setting. Please use these questions to help students understand the important concepts in this chapter. To add interest to class discussions, copy and paste some or all of these questions into a Nearpod <https://nearpod.com>, PowToon <https://www.powtoon.com>, or Kahoot <https://kahoot.it>, to create a fun, user-friendly, student-voice based, review.

1. What is content learning?
2. How do you measure content knowledge or understanding?
3. After reading chapter 2, discuss 3 technology tools you would purchase for your classroom and why you would choose them.
4. Discuss how each of these technologies meets learning goals for the classroom.
5. In your small group, discuss how technology supports content learning.
6. How would you use computers and tablets to enhance content learning?
7. Discuss, with a partner, the difference between declarative, structural and procedural knowledge.
8. With a partner, describe "Just In Time" Learning, what is it and how would you apply this concept in your classroom?
9. Describe differentiated instruction, how do assure that learning is accessible to all of your students? Discuss 3 ideas that you would use, based on the chapter reading and examples you have observed.

Case: What Do You Know?

As you read the following scenario, note the different concerns that policymakers, administrators, and other educational stakeholders have about how technology is implemented in schools.

Because of its status as a high-poverty school with students who do not make adequate yearly progress (AYP) on the state's high-stakes test, East Park High School recently received a large federally funded technology grant. The grant requires the school to create a technology plan before receiving funding. The plan must be tied to district goals and national and state standards and must provide a specific action plan that addresses how technology will help meet the content learning achievement of the school's high-needs population. In addition to other information, the plan must include a rationale for the school's proposed computer/student ratio, specific objectives with strands and timelines, and

projected yearly improvement in test scores over the next five years. The technology funded by the grant is to be aimed primarily at students who are not performing at grade level or who have not passed the state-mandated exit test after at least one attempt; this includes a large population of English language learners. However, all students at the school are expected to use the technology at some time for content learning.

- Mr. Yates, the technology teacher, is the chair of the Technology Committee (TC) at East Park. In addition to Mr. Yates, the TC consist of the vice principal, one teacher from each department at the school, and several staff members. The committee's job is to draft the technology plan. To address the criteria required by the grant, they decide to suggest first how the technology will be assigned, to whom, and in what configurations, what types of hardware and software will be purchased, and how the technology will be accessed equitably and effectively by teachers and students. The Tc will also be responsible for creating professional development opportunities for the teachers. The overall focus of its work is to figure out which needs are the most crucial and how technology can help meet those needs.

Case Review Questions

1. Answer these questions about the case with your current level of knowledge. Change or add to your answers as needed as you read and understand the issues in this chapter.
2. What kinds of hardware components should the committee choose?
Why? _____

3. What kind of software and/or Internet access should the computers have?
Why? _____

4. How can the needs of ELLs and other students with special needs be addressed in the technology plan? _____

5. How should the computers be assigned and laid out? _____

6. Do you see any problems in the way the grant was awarded or how it will be implemented? If so, what are the problems? _____

7. Mr. Yates and the Technology Committee have quite a job ahead of them, but others also have knowledge and experience that can help. Teacher input in particular will be very important to the effective development and implementation of the school's technology plan. All teachers need to understand the implications of the issues that the committee is addressing to help make effective choices for their districts, schools, classrooms, and individual students. To this end, when you finish this chapter, you will be able to:

- Explain how content learning takes place.
 - Explain the role of content learning in meeting other instructional goals.
 - Discuss guidelines and techniques for using technology in content learning and teaching.
1. Analyze technologies that can be used to create opportunities for content learning for all students, including simulations, raw data sites, and even word processing.
 2. Describe and develop effective technology-enhanced content learning activities.
 3. Create appropriate assessments for technology-enhanced content learning activities.
 4. Review the NETS for teachers in chapter 2. After mastering the content of this chapter, which of these standards will you be able to meet? _____
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- There are many theories about how the learning of “facts” takes place, from behaviorism that emphasizes the importance of practice to constructivism that focuses on the social construction of knowledge. Regardless of which theory seems most believable to individual teachers, all teachers must consider certain principles of learning, particularly when teaching with technology. This chapter will consider many of these principles. To start, see the Meeting the Standards feature for standards that address content learning.

Case Application

Mr. Yates’s committee has successfully completed a technology plan that meets the requirements of the funding. Before submitting the plan for approval, each member of the committee has been assigned a grade and content level for which to find or develop a sample lesson that meets the goals of the plan. These sample lessons are to accompany the technology plan through the approval process. Mr. Yates must produce a plan for fifth- and sixth-grade science. As a result of a Web search, he finds the lesson “What Color Are Your Skittles?” from the Educators Desk Reference site (<http://www.eduref.org>). The lesson is reproduced here.

WHAT COLOR ARE YOUR SKITTLES?

1. Submitted by: Ellyn Bewes
2. Grade Level: 5, 6
3. Subject(s):
 - Computer Science
 - Mathematics/Process Skills
4. Description: Students enter data into a spreadsheet to create a pie graph showing the percentage of colors found in a bag of Skittles.
5. Goals: Students will create and manipulate spreadsheets and graphs.
6. **Objectives:**
7. Students will create a spreadsheet to chart the different colors found in a package of Skittles.
8. Students will collect data, create appropriate charts, and use percentages to describe quantities.
9. Materials:
 - 1 package of Skittles for each student
 - computers with Microsoft Excel/access to the Internet

- floppy disks
- index cards
- What Color Are Your Skittles? Instruction Sheet

10. **Procedure:**

11. (Depending on class size and computer availability, teachers may choose to have students work individually or in pairs.).
12. Begin the lesson by distributing a bag of Skittles to each student, along with an index card. Have students look at their package of Skittles. Ask students, “How many different colors of Skittles are there? What percentage of each color do you think is in your bag?” Have students write their predictions on their index cards. “Now open your package of Skittles and tally the amounts of the different colors of Skittles.” (Students can write the colors and numbers on the back of their index cards.)
13. After the results have been tallied, hand out an instruction sheet to each student. The instruction sheet provides step-by-step directions for creating a graph using Microsoft Excel. Students should be able to follow the instructions with minimal help, but the teacher should circulate around the room to answer students’ questions. (The teacher can also encourage students to ask each other for help if the teacher is busy assisting another student.) When students have completed their graphs, they should print out a copy of their work. Students can compare their results to their earlier predictions.
14. Extension: Have students go to the Skittles Web site (<http://www.skittles.com>) to find out what percentage of each color is supposed to be in a package of Skittles—to see if their pie charts and percentages are similar to those advertised on the Web.
15. Assessment:
16. Collect students’ completed work to check for accuracy source: From HotChalk (www.HotChalk.com).
17. Mr. Yates uses a Lesson Analysis and Adaptation Worksheet (found in chapter 1 on page 33 and in the Lesson Planning Module on the Companion Website) to help him analyze the lesson. He concludes these things about the lesson:
 - No standards are mentioned.
 - The lesson requires students to use skills of data collection, estimating, counting, and data entry. There could certainly be more originality, a greater variety of language skills, and more integrated interaction. There is some scaffolding through the instruction sheet that gives step-by-step directions for completing the spreadsheet.
 - Grouping arrangements could be included to differentiate the process. A clearer connection needs to be made between this lesson and students’ lives outside school.
 - The technology is used to support student content learning. Allowing for a variety of student products might help this issue and also differentiate by allowing students to show what they know in other ways.
 - The variety of materials (Skittles, external document, computer, peers) means that ELLs and other students with diverse needs will likely be able to participate. However, the instruction sheet is only text and might be difficult for students with language barriers to understand and follow.
 - The assessment is not sufficiently detailed and does not directly link to the objectives. It uses controlling feedback and does not leave room for students to show what they know in a variety of ways.
18. Mr. Yates believes that the idea of this technology-supported lesson is good but that it needs to

focus more on students using 21st-century skills to learn content. Based on his analysis, he decides to make these changes before submitting the lesson:

19. Note relevant content area, language, and technology standards.
20. Include more skills and content. Students should work in groups so they communicate, and they should record their estimates, their actual count, and their process on a worksheet to include more language. At the end of the activity, students should also make a graph of the numbers from the Skittles Web site and compare their two graphs in text or visuals. This will require them to summarize and synthesize the information. More advanced students can also prepare a professional presentation based on their findings.
21. Hang the resulting graphs on the wall and let students peruse them. They can make notes on a worksheet of which bag of Skittles they would prefer the most, differences between how the graphs were made, and other ways they might present the information.
22. Provide visuals on the instruction sheet that show actual screens from the software so that students who need or prefer more visual orientation can access the information.
23. Provide more specific assessment and formative feedback. Mr. Yates will work with the students to develop a scoring guide that assesses not only student performance but their thoughts about the lesson in general and connections to their lives.

With these changes, Mr. Yates feels, this lesson will reflect the goals of the technology plan and provide evidence that the plan will work.

Chapter Review Questions

1. Find the content-learning standards for your state, grade, level, and content area in the standards section, located in the Teacher Tools section for chapter 1. List some of the content that your students will be expected to know. _____

2. Make a short list of ways that students might acquire declarative knowledge. What techniques or strategies can they use? How might this process affect the technology plan under development? Why? _____

3. Which of these designs should Mr. Yates and the TC choose for the high school? Why? _____

4. How do the characteristics of effective content learning tasks affect decisions that Mr. Yates and TC will make? Remember to consider the structure of high school and the fact that this high school is in a high poverty area

5. What does this process imply for the development of the technology plan at East Park High School? _____

6. How can the guidelines described here help Mr. Yates and the TC with the technology plan? _____

7. What kinds of tools will help East Park High School reach its technology and learning goals? Why do you think so? _____

8. What implication does this section on learning activities have for the TC's technology plan? _____

9. What technologies should Mr. Yates's committee add to the plan to address student assessment? Why? _____

10. What other changes, if any, should Mr. Yates make to this lesson? Why? _____

CHAPTER EXTENSIONS

- **Practice**
- Describe content learning. Review the lessons in the activities section of this chapter. For each lesson, tell which kind of knowledge each activity is designed to help students achieve (declarative, structural, or procedural).
- Evaluate software. Choose a piece of software or a Web site and evaluate it for cultural responsiveness.
 - The software supports a climate of caring, respect, and the valuing of students' cultures.
 - The software helps to build a bridge between academic learning and students' prior understanding, knowledge, native language, and values.
 - The outcomes of software use help educators learn from and about their students' culture, language, and learning styles to make instruction more meaningful and relevant to their students' lives.
 - Local knowledge, language, and culture are fully integrated into the software, not added on to it.
 - Tasks provided or supported by the software are challenging, cooperative, and hands-on, with less emphasis on rote memorization and lecture formats.
- Obtain resources. Search the Web for resources that you could access for JIT lessons that students in your classroom might need. Make a list of your findings to share with peers.
- Support strategies with technology. Choose one or more strategies for content learning learned in your other classes and note how technology might make the process more efficient or effective. For example, you may have studied mnemonic devices. How could technology be used to support mnemonics?
- Create balance. Find or use a technology-enhanced lesson for your grade level and content area.

Analyze the lesson and describe how you will balance the need to learn the technology with the requirement to learn the content.

Explore

- Adopt a model of knowledge. Using your content area, recreate the model with content-based declarative knowledge and a schema into which it could develop.
- Practice differentiating. Choose one of the learning activities from this chapter and differentiate, creating choices for one of these elements: process, product, tool, or assessment. Explain why your change is effective and for what learners.
- Adapt an activity. Choose one of the learning activities in the chapter. Adapt it as little as possible to make it work for older or younger learners or those who have different levels of skill or knowledge. Explain your changes.
- Reply to a teacher. Look at the teachers' comments in this chapter's From the Classroom features. Choose one teacher's comment and write a reply.
- Create a lesson. Choose a content area standard and develop a Slam Dunk lesson based on the framework presented in this chapter.
- Create a context-based software evaluation. Explore a classroom or school context that you are familiar with. Develop an evaluation scheme for tools for that context.
- Review technology plans. Find technology plans for other schools and districts on the Web by using one of the links that follow or doing a Web search. Examine the plans. What ideas can you see that you could use? What is missing?
- Washington State technology guide <http://www.k12.wa.us/EdTech/StateTech/#9>
- Kent School District <https://www.kent.k12.wa.us/kent>
- Research implementation. Interview an IT coordinator for a school or district. Find out how their technology plan was implemented, what the pros and cons were, and what could be done differently.
- Adapt materials. Briefly outline a technology-enhanced activity or lesson that you might use in your classroom. Review materials that you might use during the activity. Adapt the materials to make them accessible to (a) students with less proficient English, (b) students with more advanced reading skills, and (c) students with a variety of prior knowledge and experience.

- **APPLICATION**

- The following assignment is intended to help individual students go beyond what they've read and apply the information from the chapter. After reading chapter 2 students will have a broad overview of content learning and how to apply it. This application assignment will delve more deeply into content learning and how technology, more specifically apps and websites, can enhance instruction.

Assignment

Pick an app or website, from the technology tools list below, spend some time exploring this app or website, how it works and what it teaches. After exploring, please answer the following questions.

1. Which app/website did you choose? Why did you choose it?
2. Which grade level does this app/website focus on?
3. What is the content focus? How would this app/website help enhance content learning?
4. What common core standards apply to this app/website? Please list 2 and describe how this website can help you teach these common core concepts.
5. Describe how declarative, structural and procedural knowledge can be obtained, using this app/website.
6. Would this app/website be helpful in instructing ELL or Special Needs students? If so how? How will it engage students so that they gain knowledge?
7. Describe how you would incorporate this app/website into your classroom
8. List 2 ways this app/website will help you with differentiated instruction?
9. List 2 ways in which you will evaluate this app/website to determine its effectiveness in the classroom.

- **TECHNOLOGY TOOLS**

- **General Education:**

- **Smart Stars app**



[The North Star Smart Stars Survey iPad App](#)

This app is best when used at the beginning of the school year. Each student fills out the Smart Stars survey and turns it in online. This survey assists the teacher in discovering helpful information, regarding their individual student's personality and academic strengths and weaknesses. The premise of this app is based on Howard Gardner's Multiple Intelligences Theory.

Special Education

Do2Learn website



<http://www.do2learn.com>

Do2Learn provides educators with thousands of free social skills and behavioral activities. This website is full of learning songs games and ideas for communication tools. In addition, this site provides transition guides for life skills and future employment opportunities.

English Language Learners

English Media Lab website



<http://www.englishmedialab.com>

This website provides ELL learners with fun and instructive grammar and vocabulary games, along with puzzles, videos to encourage language acquisition. The site is helpful for students in grades 1-8.

Reading

Tumble Books website



<http://www.tumblemobile.com/>

Tumble Books is a creative website that can be used to build a school or classroom e-library. The Tumble books program includes over 1000 books and is appropriate for students in grades K-6. School subscribers are provided with a collection of quizzes, lesson plans, educational games and other common core based resources.

Math

Cool Math website



<http://www.coolmath-games.com>

Coolmath provides math-related games for the elementary classroom. Students in the 1-8th grade learn a variety of mathematical concepts while playing games. This site is useful for introducing new math concepts or to provide practical help for students who may have difficulty understanding a particular mathematical concept.

IXL app



<https://www.ixl.com>

IXL is a research-based site that provides K-12 students with a variety of math-related problems. This site is very useful for teaching specific mathematical concepts or for individual student practice.

Adapted Mind website



<http://www.adaptedmind.com>

Adapted minds is a research-based, common core aligned, K-6 reading and math website that personalizes games and activities to help teachers identify students strengths and weaknesses. The site can be used by instructors to create ongoing formative assessments.

Science

CSI Web adventures website



<http://forensics.rice.edu>

The CSI website is a fun critical thinking tool that is helpful for teaching Jr High and High School students the needed problem-solving skills to decipher crimes and mysteries. This site is game-based and provides a variety of videos and tools that will help students complete the activities.

Piiig Labs App



Science Experiments for Kids

Piiig Labs is a helpful app for teaching students how to complete a variety of science experiments. Using the iPad touch screen, students manipulate a variety of objects to create experiments like an exploding volcano, light switch, and soundboard, just to name a few.

<https://itunes.apple.com/us/app/piiig-labs-science-experiments-for-kids/id735909511?mt=8>

YouTUBE: https://youtu.be/iVRWMAT3G_c

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PART 2

CHAPTER 3 INSTRUCTOR'S GUIDE

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Discussion Questions

The following questions are intended for use in a small group discussion setting. Please use these questions to help the students understand the important concepts in this chapter. To add interest to class discussions, copy and paste some or all of these questions into a Nearpod <https://nearpod.com> or PowToon, <https://www.powtoon.com>, to create a fun, user-friendly, student-voice based review.

1. Discuss in small groups what it means to communicate. Describe two-way, one-to-many and many-to-many communication styles.
2. What does it mean to collaborate? Discuss how collaboration works in the classroom.
3. Please discuss any online tools that assist teachers in communicating with parents.
4. How can social media be used to help with communication and collaboration?
5. Have you seen social media contribute to good parent/student communication? If so how?
6. Conversely, have you observed social media harming communication?
7. Discuss how social media can be used to enhance parent/student communication.
8. Please discuss how social media has been used in your previous educational experiences.
9. How might you use Facetime or Skype as a communication tool?
10. Discuss how creating a classroom blog would benefit your students.

Case Study: Geography Mystery

As you read the following case, pay attention to how and with whom the teacher plans for the students to communicate during their telecommunication project.

Mr. Finely, a junior high school social studies teachers, is planning a telecommunication project for his seventh-grade students while they study the geography of the United States. This project will employ

technology to support interaction among students at a distance from each other. Participating in this project will help students understand the use and importance of latitude and longitude and the role of geographical features in people's lives. It will also help the students to meet other content, language, and technology goals and standards.

Mr. Finley's class will work on geography mysteries via email with Ms. Stewart's sixth-grade class in a different state. Mr. Finley's students will work in teams of three students. Each team will choose a place somewhere in the United States. Team members will pretend that they were dropped unexpectedly in that particular place and need help figuring out the name of the place where they are located. They may choose a city, a landmark, the top of a mountain, or some other specific point for which they will figure out such details as the latitude, longitude, nearby geographic features, how the people in the area use the land, and the mileage to nearby landmarks. They will send clues about the location in email messages to a team in Ms. Stewart's class, who will respond through email to try to discover where Mr. Finley's students are. A message from a team in Mr. Finley's class may look like this:

We are located near the capital of a state whose major industry is farming because of a large amount of volcanic soil. We are at the southern end of the largest wilderness area in the United States.

Ms. Stewart's students will use both online and offline resources to help make guesses and formulate questions to ask. A reply from the partner team in Ms. Stewart's class could be:

Are you in either Idaho or Washington? What is your elevation? Are you above the 45th parallel?

After Ms. Stewart's students guess the location correctly, they will make a map online M. Weinelt's Online Map Creation site (<https://enterprise.google.com/maps/>), using latitude and longitude to show the location. The classes will then switch roles and Ms. Stewart's students will send clues to Mr. Finley's class.

Mr. Finley expects the project to take six weeks, during which time students in both classes will be studying different aspects of geography that would help them solve the mysteries. In addition, Mr. Finley has developed some scaffolds in the form of handouts to help students think about the group processes and to make good guesses. Mr. Finley also plans lessons on skills needed to communicate effectively, on email etiquette, on group work, and on logic and problem-solving. Mr. Finley has done a similar telecommunications project with previous students and expects that his current students will work enthusiastically on this one.

As he makes copies of the starting instructions, which he will also explain or a lead to the students, Mr. Finley feels excited to begin the project, but he wonders if he has considered everything he needs to make this project a success.

The process of supporting communication with technology, like the content learning process described in chapter 2, includes the basic categories of planning, developing, and analysis/ evaluation. Following the steps in Table 3.1 can help teachers plan communication and collaboration activities effectively and efficiently.

Planning

During the planning stage, teachers should make sure that the process and outcomes are specific, relevant, and based on goals. Using objectives that state what the student will be able to do, to what

extent, and in what way will assist in developing the rest of the lesson plan. For example, an objective that states, “The student will be able to describe five ways in which PCs and Macs differ” would be more effective in helping focus the lesson than a very broad objective that states, “Students should understand computers.” In addition to clear outcomes, the plan should include how and with whom students should interact. During the planning stage, teachers and students can decide whether technology is needed and if so, what kind of technology and how the chosen technology can meet the needs of students with different abilities. At this point, a review of other technology-supported communication projects might help teachers and students from forgetting something important that can make or break the activity.

During the planning stage, the teacher should also find and evaluate potential participants and prepare them to understand the goals and responsibilities of the project. Many electronic lists and Web sites provide details of projects that teachers can join and allow teachers to post their own projects to find participants. iEARN (www.earn.org) and Kidlink (www.kidlink.org) are two excellent project sites. Kidlink offers projects in many languages so that beginning English language learners can participate. Before they participate in the tasks, students should

understand the writing conventions of their partners, especially if they are using a slightly different form of English (British English, for example). In addition, teachers should help students to figure out the language and content knowledge they need to grasp to communicate clearly and effectively during the project.

Development

The planning stage is the most crucial for creating a successful project, but the teacher’s job does not end there. It is essential during the project development and implementation stage that the teacher observes students and makes changes in the project as necessary to meet student needs and curricular goals. Providing just-in-time skills lessons and coaching on team-building are also part of this stage.

Analysis

Analysis of the project should be conducted by all participants so that different perspectives are gained. Participants should also take part in the evaluation of the task process and product. Finally, the teacher must provide appropriate closure, such as whole group discussion, a summary, or a debriefing about group process. More information on the assessment of communication projects is included in the assessment section of this chapter.

What other steps in planning could Mr. Finley add to his project? What, if anything, did he neglect to do?

Tools

As technology improves, it becomes more accessible to everyone. Communication becomes possible even for severely challenged students. Formerly most assistive tools were add-ons or special purchases, but now a host of tools can be found on every new computer.

Mr. Finley’s project can take advantage of many of these tools. For example, because

<https://www.gaggle.net> is web-based, students with visual impairments and those who learn best orally can use screen readers that turn text into speech to read the emails to them. Screen readers are built into most new operating systems. Windows XP includes Narrator, and Apple OS X includes the screen reader VoiceOver. For a list of other screen readers see the “list of screen readers” at <https://www.wikipedia.org>.

In addition, during the computer-supported project students with visual impairments can use the magnifier function built into the computer’s accessibility features to make the text large enough for them to read comfortably. The user can choose the level of magnification and how the magnified items will appear. In Windows, the user can choose start>control panels and find the magnifier easily.

Students who have trouble typing can use the sticky keys function, which allows the user to press the keyboard commands such as Shift or Control only once and have it stay active until pressing another command key. In addition, an on-screen keyboard can make it easier for some students to type.

Find the accessibility options offered by the operating system on your computer and list them here. Which ones might help you use the computer more effectively?

Tool Close Up: Asia Inspirer

As implied in this chapter, the designation of software as communication software characterizes how the software is used, not what it contains. Asia Inspirer (Tom Snyder Production) has teams of students (or, alternatively, the whole class or a single team) traveling in continuous countries

throughout Asia to land in countries that have specific demographic, economic, and/or geographic features. The accompanying trip assignment image shows the features that one team must aim for. They are trying to land in countries that have the most tea and lumber and end up in a country with a specific population density on the last of their 10 moves.

Each student on the team has a different map of Asia that shows one or more of the features, and students must pool the information to travel to countries with the highest number of features to earn the most points from their travels. Student interaction is initiated not only by the need to cooperate on the facts but also on the need to figure out how they will cooperate at all. They have to negotiate turn-taking, leadership, and other roles in the group in addition to describing and answering questions about the countries on their maps. The level and amount of interaction is up to the team, and the maps provide scaffolding, so even limited-proficient language learners can join in easily. In addition, the teacher chooses the difficulty level, timer settings, and different configurations (head-to-head competition or team cooperation); this provides slower learners or those who need more time or support with more opportunity to participate.

Asia Inspirer is designed for use in the one computer classroom. groups take turns inputting their moves while the rest of the groups are plotting the routes at their desks. In this way the objectives of learning Asian geography and economy and of collaborating are central, and the technology is used as a support for goals.

Under what circumstances might a teacher choose to use a program with these features with the whole class? With teams? For a single team? Why?

CASE REVIEW QUESTIONS

Answer these questions about the case. There are no right or wrong answers to the shop to preview—the goal is for you to respond before you read the chapter. Then, as you interact with the chapter's contents, think about how your answers might change.

1. What learning benefits might the sixth- and seventh-grade students derive from participating in this telecommunications

2. How can working with students at another school contribute to Mr. Finley's students' achievement?

3. How did Mr. Finley approach the use of technology to meet his goals?

4. What other ways can Mr. Finley ensure the success of this telecommunications project?

Mr. Finley chose to have his students communicate with students in another school by email for the geography mystery project, but he could have chosen a variety of other participants and means of communication. It is important for teachers to understand the implications of the available choices to choose wisely. To this end, when you finish this chapter you will be able to:

- Define communication, collaboration, and related terms.
- Describe the communication process and explain how communication affects learning.
- Discuss guidelines and techniques for creating opportunities for technology-supported communication and collaboration.
- Analyze technologies that can be used to support communication, including MOOs, email, chat, blogs, and wikis.
- Describe and develop effective technology-enhanced communication activities.
- Create appropriate assessments for technology-enhanced communication tasks.

When you have completed this chapter, which NETS*T will you have addressed?

SAMPLE LESSON: COMMUNICATION

Mr. Finley's telecommunications project went very well, and he and his students are excited about trying another project. Mr. Finley decides to look at other communication-based lessons to find another project that might be appropriate for his students. The standards addressed by this lesson include math standards such as problem-solving, reasoning, connections, and skills (statistics); content reading standards such as a variety of sources, information access, and evaluation; and writing content standards.

The lesson Mr. Finley chose from the Educators Reference Desk (<https://eduref.org/lessons>) is presented here.

MINI STUDY OF A STATE

Author: Unknown

Grade Level(s): 4, 5, 6, 7

Subject(s):

Social Studies/State History

Objectives:

The students will learn to do research while comparing their state with one of the states of the U.S. They will be graded on information, drawing and artwork, spelling and punctuation, and neatness.

Activities:

The students are given the following questions in a prepared booklet in which they write their answers. There is also room provided for them to draw the state flag, flower, tree, bird, and a map of the state.

1. Name of state:
2. Capital:
3. Is this state larger or smaller than (*****)?
4. Name all of the states, countries, or bodies of water that surround this state.
5. About how many people live in this state? Is that more or less than (*****)?
6. Name two prominent people that are from this state. Why are they famous?
7. What are the chief products of this state?
8. What kind of climate does this state have?
9. Tell about three things in this state that are very different from (*****).
10. Tell about three things in this state that are much the same as we have in (*****).
11. If you were traveling from, (*****) to the capital of this state, how many miles would you drive?
12. How long would it take you to drive it if you drove 50 miles an hour?
13. These are facts about this state, that I think, are interesting . . .
14. I would like to live in this state because . . .

15. I would not like to live in this state because . . .
16. Make a pictorial graph of the population of your state and the state of (*****).
17. When did it get its statehood?
18. Who is given credit for finding this state?
19. How did the U.S.A. get the land?
20. Tell three other historic things about your state.
21. Draw the state symbol and give an explanation.
22. What is the state motto?
23. What is the state's nickname?
24. Name three places to visit and tell about these places.

Mr. Finley completed a Lesson Analysis and Adaptation Worksheet (found in chapter 1 on page 33 and in the Lesson Planning module of the Companion Website) and concluded these things about the lesson:

- There are no standards mentioned, but learning about the geography of the states is part of the grade 7 standards.
- Some of the questions ask students to do more than memorize, but 21st-century skills and literacies could be incorporated more.
- No explicit resources are mentioned—a variety is needed.
- Links are made between students' home states and the states they are studying, and all students can actively search for information.
- There is no mention of technology use, but there are obvious ways to integrate it.
- A variety of resources, languages, and options is needed to meet the needs of diverse students.
- No assessment is included.

Mr. Finley likes the basic idea of this lesson and the variety of questions asked. However, based on his analysis and his knowledge of his students, he decides to make some small but important changes to the lesson. He wants to especially make sure that all students have access to the information. In addition to adding appropriate standards, he decides to make these changes based on his analysis:

- Provide students with prescreened resources at a variety of levels and in a variety of media to do the initial investigation of their state. In this way, all students will have information that they can access.
- Provide scaffolds such as formulas, worksheets, and experts to support student responses to the questions. In addition, students can choose to work in groups if they have a plan for completing the work.
- Incorporate seventh-grade keypals (electronic penpals) from each of the states under investigation who can verify and/or discuss responses to students. This telecommunications component will allow students to check the verity of their initial resources and gain different perspectives on some of the information they find.
- Vary the product, allowing students to produce a book, make a poster, or prepare a multimedia presentation. Doing so takes into consideration the variety of skills, abilities, and desires of his students.
- Ask the students to help develop process and product rubrics for the project.

With these changes, Mr. Finley feels that this lesson will help all his students meet many learning goals.

CHAPTER EXTENSIONS

Adapt

Choose a lesson for your potential subject area and grade level from the lesson plan archives at Educators Desk Reference (<https://eduref.org/lessons>). Use the Lesson Analysis and Adaptation Worksheet from chapter 1 (also available in the Teacher Toolbox) to consider the lesson in the context of communication. Use your responses to the worksheet to suggest general changes to the lesson based on your current or future students and context.

Practice

1. Integrate the standards. Choose one or more of the activities in the chapter and note which technology standard(s) the tasks can help to meet.
2. Improve an activity. Choose a technology-supported activity example from the chapter and add details that would help to make it successful. For example, you may need to outline specific roles, choose a specific technology, or note an important safety tip.
3. Think about learning. Choose an activity from the chapter and explain how the communication might lead to learning. Say what students will learn, both what is obvious and less obvious.
4. Create a rubric. Create a rubric to assess both group process and individual participation for any of the example technology-supported tasks. Use one of the rubric generators listed in the assessment section of the chapter or develop your own.
5. Reflect on language. Use the chat abbreviations (e.g., “lol” for “laughing out loud”) and emoticons to send a message to a friend, peer, or the instructor. Describe how this “language” differs from the classroom language that students must learn and use. How can you use this knowledge in your teaching?

Explore

1. *Revise an activity.* Choose one of the learning activities in the chapter and adapt it for your content area and/or grade level. Add or change technology and change the existing audience as necessary. Briefly explain your changes.
2. *Assess.* Review the sample rubric in the assessment section of the chapter. Keeping the general structure and intent, change the question to evaluate a different activity.
3. *Create a project.* Choose a grade level and content area and create a telecommunications project following the guidelines from this chapter. Note what other ideas not mentioned in this chapter should be included, e.g., a different form of assessment or another type of technology.
4. *Explore a tool.* Choose a communication and/or collaboration tool and evaluate it for use by your current or potential students. Make a handout to help students use it effectively or a handout with guidelines for a project using the tool.
5. *Invent a tool.* Be imaginative—invent a tool that would meet the goals for collaboration without

any of the challenges we currently experience. What would it look like and do?

Chapter Application

The following assignment is intended to help individual students go beyond what they've read and learn to apply the information from the chapter. After reading chapter 3 students will have a broad overview of social media and how to apply it. This application assignment will delve more deeply into the use of technology, more specifically school approved social media sites and classroom communication tools.

Questions

Lesson 1

Please choose one of the school approved, social media sites listed below and develop a plan to use this website in the classroom, after choosing the website please respond to the following questions.

1. Which social media site did you choose? Why did you choose this site?
2. How would you plan to use this site in the classroom?
3. Please list 2 objectives you would put in place for this assignment.
4. List the 3 communication patterns that are used in the classroom, found in the chapter. How could you use this site/app to help with at least 2 of these patterns?
5. Would Facebook work in the classroom? Please explain why or why not?
6. Compare and contrast the differences between Facebook and the school approved site you've chosen.
7. What is the difference between asynchronous versus synchronous communication? Does this site/app use one or the other or both?
8. How can the use of social media, in the classroom, help students? How might it hinder them?
9. How might you use this social media site in a specific content area such as math, reading etc.? Please explain.
10. Would this site help you in scaffolding the class information for your students?
11. What safeguards would you put in place to protect your students?

Social Media sites



Edmodo: <https://www.edmodo.com/teachers>



Schoolology <https://www.schoolology.com>



Twiducate <https://www.livelingua.com/twiducate/>

Lesson 2

Spend some time researching various tools, found in the list below, that can be used in the classroom to improve communication with students and parents. After choosing one of these options, please respond to the following questions.

1. Which websites or apps did you explore? Please explore at least 2.
2. Which site/app did you choose? How would you use this site/app in the classroom?
3. Please list 2 objectives you hope to accomplish using this site/app.
4. List the 3 communication patterns that are used in the classroom, found in the chapter. How would you use this site/app to help with at least 2 of these patterns?
5. Does this site/app help with communication from teacher to parent, or teacher to student or both? Please explain.
6. What is the difference between asynchronous versus synchronous communication? Does this site/app use one or the other or both?
7. What content area would you consider using this site/app in? Please explain.
8. Would this site help you in scaffolding the class information for your students? Please explain.
9. Does this site/app provide a place to load student homework or accomplishments?
10. Is this site/app user-friendly? Please explain.
11. How would you implement the use of this site in your classroom?

Classroom Communication, parent/teacher tools



Class Dojo <https://www.classdojo.com>



Appletree <https://www.goappletree.com>



Teacher Kit <http://teacherkit.net>



Edublogs <https://edublogs.org>



Group Me <https://groupme.com/en-US/>

4

CHAPTER 4 INSTRUCTOR'S GUIDE

The instructor's guide contains several useful tools, discussion questions, a case study, review questions, additional chapter assignments, lesson examples and a student application assignment. As the Instructor, pick and choose which of these materials work for you or you may decide to use our ideas and create your own. This guide is intended to help solidify the information from the chapter and help you as an instructor implement the application of these materials.

Discussion Questions

The following questions are intended for use in a small group discussion setting. Please use these questions to help the students understand the important concepts in this chapter. To add interest to class discussions, copy and paste some or all of these questions into a Nearpod <https://nearpod.com> or PowToon, <https://www.powtoon.com>, to create a fun, user friendly, student-voice based review.

1. Discuss your understanding of critical thinking?
 2. How do we use critical thinking skills in everyday life?
 3. How important is critical thinking in the classroom? What role do critical thinking skills play in the classroom?
 4. Discuss the 4 central components of the critical thinking process, listed below. How do these components contribute to the process?
 - Review your content understanding.
 - Analyze the material
 - Synthesize your answers regarding the material.
 - Evaluate the decision making process.
-
1. What role does technology play in the critical thinking process?
 2. Does the use of technology help or hinder the critical thinking process? If so how?
 3. How is critical thinking a higher thinking skill?
 4. Considering common core standards, how does the critical thinking process apply?

CASE STUDY: Urban Legends

As you read the following scenario, note how the teacher guides the students to think critically about the information that they receive as a result of technology use.

Mr. Andres's the fourth-grade class was abuzz. The noise was coming from near one of the room's computers, where the teachers aid and one of the students, David Perez, were involved in a discussion in front of the computer. Many of the other students in the class were gathered around listening and commenting. Mr. Andres approach the group to see why so many students seem to be off the task he had assigned.

"what's up?" He asked as he approached the scene. One of the bystanders explained that David had received an email from his principal in New York that contained some interesting news. Hmmm, thought Mr. Andres, I have read all the emails and didn't read something that I thought would cause such a stir. He asked David and the aid, "What's this all about?"

David exclaimed excitedly, "Janet is afraid to ride the subway to school anymore! She says there are alligators in the sewer that could get into the subway! Is that cool or what?!"

"My," responded Mr. Andres. "Alligators in the sewers of New York? That's interesting." He remembered seeing the story in Janet's email. It was an urban legend, or a popularly believed story, that he had heard before. He had thought that Janet mentioned it as a joke to entertain David.

"Oh, yeah, well, it's true," replied David. "Janet read about it on the Internet. The story said that they were flushed down the toilet as babies by people who didn't want them as pets and now there's lots of them!"

"Ah," said Mr. Andres "She saw it on the Internet."

Anna, another student, said, "It's not true, is it, Mr. Andres? Tell us!"

Other students chimed in. "Yah, tell us!" "What's up with that?" "Is it for real?!" they exclaimed. Then the teachers aid broke in and said to Mr. Andres, "I have been trying to tell them it isn't true, but they won't listen!"

"Well," said Mr. Andres, "maybe they need to find out for themselves whether there are alligators in New York's sewers. Sounds like a great project to me. Let's finish up what we're doing and then we'll talk about how we'll discover the truth."

At the end of the class, Mr. Andres had David explain the situation to the rest of the students. Mr. Andres asked how many students thought there might be alligators under New York City, how many believe that there could not be, and how many weren't sure. Most of the students were not sure.

"How can we find out?" Mr. Andres asked the class.

The students brainstormed how they might find out whether there really were alligators in the sewers of New York City. After brainstorming, the students decided that they needed to read the original story on the Internet that Janet had written about, do some Internet and library research about alligators, discover online and offline resources for information about sewers, and find email contact information for some New York city officials to gather more data. When they had enough useful information from reliable sources, they would decide whether Jenny really had a reason to fear.

Mr. Andres thought that this was a great opportunity for his students to develop critical thinking skills such as analysis, evaluation, interpretation, and explanation. At the same time, students will also enhance their technology skills by using a variety of tools; discover more about government agencies, reptiles, and big city life; and practice reading, writing, and other skills that were part of the fourth-grade curriculum.

Case Review Questions

Answer these questions about the case. There are no right or wrong answers to this chapter preview—the goal is for you to respond before you read the chapter. Then, as you interact with the chapter's contents, think about how your answers might change.

1. What kinds of skills do David and his peers need to use to discover the answer to their question?

2. What support should Mr. Andres give to facilitate the students critical thinking?

3. What should Mr. Andres's role be in teaching critical thinking skills?

4. What role will technology play in helping the students to think critically?

Mr. Andres recognized an immediate opportunity to help his students learn and practice critical thinking skills. He made the choice knowing that he was deviating from his original unit plan, but he understands the important of teachable moments, particularly when they focus on essential skills such as critical thinking. The goal of this chapter is to help you to understand the roles that teachers and technology can play in developing student critical thinking skills. After reading this chapter, you will be able to

- Define critical thinking.
- Understand the role of critical thinking in meeting other learning goals such as creativity and production.
- Discuss guidelines for using technology to encourage students critical thinking.
- Analyze technologies that can be used to support critical thinking, including strategy software to students organize their thoughts, Web-based tools that both encourage and evaluate critical thinking,

content software from companies such as Tom Snyder Productions, and content-free programs such as critical thinking.

- Create effective technology-enhanced tasks to support critical thinking.
- Employ technology to assess student critical thinking.
- When you have completed this chapter, which in NETS*T will you have addressed?

Further discussion

-Write three objectives for Mr. Andres project that focus on the thinking skills that he might expect students to learn while they research the alligator question.

-What challenges might Mr. Andres face in supporting his students to think about alligators in New York Sewer? How might he address these challenges?

-Which of these guidelines is Mr. Andres following? How can he incorporate the others as he and his students develop their project?

-Which of the tools mentioned below might the students in Mr. Andres is class benefit from as they build their arguments about alligators in the sewers?

-What other documents might help students think critically during this task? Describe one.

-What issues might be more suitable for students to your grade level and content area to think about? Why?

-What other kinds of documents or support my students need to help them think critically about what they read? What other questions could help the students work through the critical thinking the process during this task?

-Look back at the section earlier in the chapter about media literacy. What other questions might you ask students about advertising to help them think critically about it?

-What else would you add to this lesson to make it effective for your current or future students? What would you delete? Why?

Tools

Many content-free tools can be used effectively as part of critical thinking tasks. Tools in the Microsoft office suite can be considered “content free.” In other words, although they contain specific structures, the content that is entered into those structures is up to the user. Teachers are sometimes reluctant to introduce spreadsheets like Microsoft Excel to students because they perceive them as difficult to understand and use and because they think of them as tools for specific purposes. However, as with all powerful tools, students do not need to understand every feature or capability to use the spreadsheet effectively for a variety of tasks.

Students (and teachers) first need to understand what a spreadsheet is and what it can be used for. A spreadsheet is a table that consists of cells. Each cell contains a value, usually (but not always) in number form. After users input data into the cells, they can generate relationships between cells, called formulas. The formula is typed in the formula bar and indicates the values in the cells that are part of the formula and also the operations (e.g., addition, division) that will be performed using those values. Making a formula is most like using a calculator.

As a simple example, look at the accompanying screen. I want to add 2 (the value I enter in cell A1) and 2 (the value in B1). I click on the cell where I want the answer (C1). Then, I enter the formula “=Sum (A1: B1)” and when I press Enter, the answer, 4, appears in cell C1.

In spreadsheet software, several pages or sheets can be linked together, and the results of calculations can be made into graphs and charts with one click. Spreadsheets can be used to make all kinds of calculations, from the monthly payment on a car to converting Fahrenheit to Celsius temperatures. More important, spreadsheets help students turn data into information that can be used as the basis of critically made decisions. For example, i4c (<http://www.internet4classrooms.com/>) shows teachers and students not only the basics of using Excel but also how to calculate the price of a pizza per square inch and so the side of the snack is worth the money. Other tasks presented on this through website include calculating the cost of a trip by car (the same can be done for air travel and the results compared) and figuring out how much a student would weigh on another planet. With the additional training provided and tutorials across the web, excel another spreadsheet can be used in an uncountable number of ways to support critical thinking. Another example of spreadsheet use in a critical thinking activity is provided in the lesson of the end of this chapter. While the tools presented in the critical thinking technology section of the chapter maybe developed expressly for critical thinking tasks, it is important for teachers to know ways that they can support critical thinking with software like Excel, which may already be available in their classrooms.

A note of caution younger students or students with moderate disabilities may have difficulty using XL or another spreadsheet program if their fine motor skills are not developed enough to designate the

appropriate cells using the mouse. This can lead to frustration with the software. There are many possible solutions. For example, larger amounts can be used, the zoom features can make the cells appear larger, or the students can provide the contents and a more expert computer user can input the data.

For free spreadsheet software that works in the same manner as excel, go to <http://www.gooffice.com> or <http://www.thinkfree.com>.

How could Mr. Andres's students use a spreadsheet for their project? How do you use spreadsheets?

SAMPLE LESSON: CRITICAL THINKING

After completing the Urban Legends project with his class, Mr. Andres realizes that his students need more instruction in and practice with critical thinking. He decides to create a project that will help his students gain these skills while addressing curricular goals related to nutrition and basic economics. He chooses a promising lesson from the Internet4Classrooms Technology Integrated Lesson Plans page (<http://www.internet4classrooms.com/>). The lesson is presented here.

FAST FOOD FUN

[Sample Spreadsheet] [Rubric] Found in Chapter 1

Objective:

Use the Internet and spreadsheets to find calories and fat in a typical fast food meal.

Project Rubric:

Information on how this project will be graded.

Procedure: Step One:

Decide which fast food restaurant you would like to visit. Click on that restaurant's Web site below.

McDonald's: http://www.mcdonalds.com/app_controller.nutrition.index1.html

Burger King: <http://www.bk.com/>

Wendy's: http://www.wendys.com/the_menu/nut_frame.html

Other Restaurants: <http://www.nutritiondata.com/> (This site allows you to search many fast food restaurant sites.)

Once there, plan a meal with a sandwich, salad or another main dish, a side dish (french fries, etc.), a drink, and a dessert. For each item on your menu, record the total calories and the calories from fat.

Step Two:

Enter your data into an Excel spreadsheet. Click here to see a sample and directions for completing the spreadsheet. When you have finished your spreadsheet and charts, complete the handout and return

here for the rest of the project directions. Compare your answers to at least one other student. In your notebook, record information about which restaurant they visited, what food they ate, and the nutritional content of that food.

Step Three:

Visit the United States Department of Agriculture to find out more about healthy eating guidelines: <http://www.nal.usda.gov/fnic/dga/dguide95.html>. Browse through this site and answer the questions on your handout.

Step Four:

Using Microsoft Word, type a three-paragraph report about your findings. Use the format for a one-page report.

Paragraph #1: Introduction including which restaurant you chose and the items on your menu.

Paragraph #2: Summarize the findings about your meal, including the number of calories, percentage of fat, etc. Copy and paste one of your charts into your document as supporting evidence.

Paragraph #3: Compare and contrast your meal with another student. Use the information you recorded in step 2.

Paragraph #4: Use the information from the Department of Agriculture to evaluate your meal. How does your percentage of fat compare to the percentage recommended? What about other guidelines like eating fruits and vegetables? Have you planned a healthy meal? What changes might you make in your meal to make it healthier?

Source: Web Weavers Education Page. Copyright © 2000. Karen Work Richardson.

Mr. Andres read the lesson and the links to the lesson supplements carefully to make sure that students would meet the goals he requires. He completed a Lesson Analysis and Adaptation Worksheet, found in chapter 1.

- No standards are mentioned, but Mr. Andres can easily align the lesson with state and national standards.
- Students are asked to use some higher order thinking skills such as summarizing, but adding some essential questions might help focus even more on critical thinking. Students are also asked to work on communication and technology skills.
- Students have a choice of fast-food companies to focus on, but the materials are mostly online and text-based.
- Students have their own authentic task to accomplish. ELLs can choose the level of reading that works for them in the fast-food sites, but they may also need more scaffolding to collect the initial data.
- The technology supports access to a variety of resources and focal calculations that students must do to complete the task.
- The lesson includes an appropriate rubric, samples and scaffolds to help students use the

spreadsheet, and both reading and writing components. However, all students are required to complete an essay, and no accommodations are made in the product requirement for students who reflect their learning better in other ways.

This lesson has many outstanding aspects. However, based on his analysis and his knowledge of his students, Mr. Andres decides to make some small but important changes to the lesson. He especially wants to make sure that the ELLs in his class will be able to participate fully. He decides to make these changes based on his analysis:

Spell out the appropriate standards and curricular goals.

Add additional resources such as charts, pamphlets, and other sources of information about fast food. Some of these will be in the first language of his ELLs.

Include additional questions to help students think critically. For example, ask them to think about the resources they are using—would any bias be expected? Why or why not? What other resources would help them determine if they have factual information? Also, ask them to take a position and argue about whether people should eat fast food based on its nutritional value alone.

Give students a choice of products. They may produce the essay or a poster, a multimedia presentation, a letter to a fast-food company, or an oral argument.

Mr. Andres thinks that this lesson supports critical thinking and other skills with technology well and will help his students be better consumers both of fast food and information.

CHAPTER EXTENSIONS

Adapt

Choose a lesson from your potential subject area and grade level from the Internet4Classrooms age of Integrated Technology Lesson Plans (<http://www.internet4classrooms.com/>). Use the Lesson Analysis and Adaptation Worksheet from chapter 1, to consider the lesson in the context of critical thinking. Use your responses to the worksheet to suggest general changes to the lesson based on your current or future students and context.

Practice

1. *Integrate the standards.* Choose one or more of the activities in the chapter and note which content and technology standard(s) the lesson can help to meet.
2. *Write a test question.* Review any of the tasks or activities in the chapter. Choose one, and write one test question that can assess students' critical thinking. Explain how your question assesses student thinking about content or language.
3. *Revise an external document.* Review the external documents presented in the chapter. Make improvements by editing or revising according to the goals for external documents. Justify your changes in writing.
4. *Review a tool.* Obtain one of the critical thinking tools discussed in this chapter and learn more about it. List 5 ways that you could use this tool effectively in your future classroom.

Explore

1. *Revise an activity.* Choose one of the learning activities in the chapter and adapt it for your content area and/or grade level. Add or change technology. Change the existing document or create a new external document as necessary. Briefly explain your changes.
2. *Assess.* Review the sample test question in the assessment section of the chapter. Keeping the general structure and intent, change the question to evaluate the activity that you adapted for the previous question.
3. *Think about challenges.* Revisit a lesson that you have created. Think about and describe the challenges that students face during the lesson. Who might be bored? Who might feel too challenged? How can you adjust the lesson so that everyone feels the appropriate amount of challenge? How can technology help?
4. *Create a document.* Choose or create a technology-enhanced task or activity. Develop an external document that supports the use of critical thinking skills to accompany your activity. Justify your choices.
5. *Create questions.* Look at a reading, online or off, that you might use in your classroom. Discuss how the use of this reading might be improved by asking the right questions (what would they be?) and/or using critical thinking technologies.
6. *Develop a lesson on critical thinking.* Create a task or lesson to help students learn about the critical thinking process. Explain how your lesson meets this goal. Describe how your lesson could effectively use technology.

Student Application

The following assignment is intended to help individual students go beyond what they've read and apply the information from the chapter. After reading chapter 4 students will have a broad overview of content learning and how to apply it. This application assignment will delve more deeply into content learning and how technology, more specifically kid-friendly news websites.

Questions

1. Please use one of the websites listed below to Identify a story that students would find interesting and require additional research to confirm its credibility. Post a link of the story to the course assignment page, in addition, please answer the following questions.
2. Consider the 4 guidelines from the chapter,
 - Reviewing:
 - Analyzing:
 - Synthesizing:
 - Evaluation:

How will you use these guidelines to help students find accurate news sources? Please provide an

example of each guideline, based on the story you choose to use for this assignment.

3. Consider your roll in the critical thinking process, how will you help your students to access these skills?
4. What technology tools are available for students to help them research a particular article or subject? Please list and discuss 2 options available in most classrooms.
5. When using critical thinking skills, list several ideas from the chapter that can help students understand when a story, they hear or read, is credible.
6. Refer to the NETs standards found in chapter one, which of these standards will you have addressed while completing this assignment?

News sources for kids



<https://www.dogonews.com>



<http://magazines.scholastic.com>



Readable,
Teachable
News.

<http://teachingkidsnews.com>



<http://www.timeforkids.com>

5

CHAPTER 5 INSTRUCTOR'S GUIDE

The instructor's guide contains several useful tools, discussion questions, a case study, review questions, additional chapter assignments, lesson examples and a student application assignment. As the Instructor, pick and choose which of these materials work for you or you may decide to use our ideas and create your own. This guide is intended to help solidify the information from the chapter and help you as an instructor implement the application of these materials.

Discussion questions

The following questions are intended for use in a small group discussion setting. Please use these questions to help the students understand the important concepts in this chapter. To add interest to class discussions, copy and paste some or all of these questions into a Nearpod <https://nearpod.com> Kahoot, <https://create.kahoot.it/login> or PowToon, <https://www.powtoon.com>, to create a fun, user-friendly, student-voice based review.

1. In your own words define and discuss creative thinking.
2. How important is creative thinking in the classroom? Why?
3. Discuss the teachers roll in encouraging creativity, using 2 examples from the text.
4. Define the creative thinking process from a student's perspective.
5. Discuss divergent thinking, how does it differ from convergent thinking?
6. Based on the text, discuss 3 ways in which you as an instructor can encourage creative thinking in the classroom.
7. Please consider how you would foster creative thinking in your classroom? Discuss your ideas with a partner.
8. Teacher hacks and Makerspaces are a relatively new concept for classroom creativity building. Please discuss these concepts in your small groups and how you would plan to use them in your future classroom.

Case: Circus Project

As you read the following scenario, think about how teachers and technology can support students creativity.

The students in Pam Grove's first-grade class were excited about their circus project. Not only did they get to draw their own circus train cars on the computer, but also the completed train with all the student's pictures would be displayed for the whole school. Jamie Johnson had worked hard sketching her animal car on paper using crayons and a ruler as the teacher required. She had also learned how to use KidPix <https://www.mackiev.com/kidpix/index.html> software from the student technology leader in her group. Earlier in the week, she had started the computer rendering of her circus car. Now it was

her group's computer center time again, and they were to finish drawing their train cars in KidPix following their sketches as carefully as they could.

Jamie had drawn a rectangle for the outside of her car and circles for the wheels. She had colored the car bright pink, her favorite color, and the wheels light blue. Now, looking at her sketch, she decided that the bars in the car look much too zoo-like and that she would use windows and curtains instead in her KidPix version to make her animals feel more comfortable. She carefully drew squares for the windows and used the KidPix paintbrush to add colorful striped curtains. She was pleased with the results and was working on drawing a lion in one of the windows when Ms. Groves came by to check on the team's progress.

Ms. Groves looked at Jamie's sketch and then at the computer where her drawing was almost finished.

"What are these, Jamie?" asked Ms. Groves. "Windows," said Jamie.

"But why are there windows? There are no windows in your sketch. And why are your wheels blue instead of black like they should be?" the teacher questioned.

"I wanted the animals to be comfortable. And they look better this way," Jamie explained.

"Yes, but it's not real," said Ms. Groves as she reached over and deleted the picture. "Now start again and do it right. You'll have to hurry if you're going to have your car displayed with all the rest."

Answer these questions about the case. There are no right or wrong answers to this chapter preview—the goal is for you to respond before you read the chapter. Then, as you interact with the chapter contents, think about how your answers might change.

1. What should Ms. Groves have done when she saw Jamie's colorful circus train car with windows? Why?
2. What role did Ms. Groves take in this project? What should the teacher's role be in enhancing student creativity?
3. What roles can technology play in enhancing and supporting student creativity?
4. What are some benefits that students might derive from using technology to support creativity? Are there any potential disadvantages?

Ms. Groves missed an opportunity to support Jamie's creativity and to reinforce her creative thinking skills. Because she had a specific idea of how she wanted the finished product to look, Ms. Groves expected all the students to do it the "right way." The goal of this chapter is to help you understand that often there is no "right way," and that student creativity should be nurtured and encouraged. Technology can be used in many ways to meet this goal, particularly because it gives teachers and students options. This chapter addresses some of the ways that technology can help. After reading this chapter, you will be able to

- Define creativity.
- Understand the importance and benefits of creativity in life and learning.

- Discuss guidelines and technological tools for encouraging student creativity.
- Create effective technology-enhanced tasks to support creativity.
- Assess creativity and technology-enhanced creative tasks.

When you have completed this chapter, which NETS*T will you have addressed?

Case Review Questions

The chapter extensions at the end of the chapter will help you to practice and reflect on providing opportunities for student creativity. For standards that guide creativity and therefore the content of this chapter, see the Meeting the Standards feature.

-What habits of mind might Ms. Groves process that led to her reaction to Jamie's creative drawing?

-Should Ms. Groves have Inc. more opportunity for the creativity into the circus train project? Why or why not?

-These benefits might seem abstract, and therefore not useful, too many students. How would you help your students understand The practical importance of creativity?

-How could technology be used to support this lesson?

-What does Ms. Groves need to do to meet these guidelines?

-Which of these guidelines did Ms. Groves meet? Which does she still need to work on?

-What else would you add to this list of bottles that support creativity?

-What other resources would you add to this list?

-What other resources would you add to this list?

-What other creativity resources would you add to these lists?

-What are the resources would you add to this section on the creativity tools?

-Based on your chapter reading, how do you think Ms. Groves could have made better use of that kid pix program with her class?

-In what other ways could Ms. Groves change this lesson to make it even more effective for her students?

-Which information in this chapter is most valuable to you? Why? How will you use it in your teaching?

Both Prezi and Microsoft PowerPoint presentation software allows teachers and students to create interactive, multimedia presentations containing text, graphics and photos, animation, audio, and video. Prezi and PowerPoint are both widely used programs not only because they are easy to learn. They each allow imaginative users to use it creatively and each program is limited in application only by the users' imaginations.

Prezi and PowerPoint both consists of a number of screens, or "slides," to which the user adds content and then links to other slides in a "slideshow." The software includes templates for slide layouts and designs for students who need such scaffolding, but students can also work from scratch. Other tools in Prezi and PowerPoint include online collaboration and broadcast, diagrams and charts, drawing tools, and notes pages.

In addition to presenting information to the class, the software can't support teachers and diverse students in creative pursuits. For example, student or the teacher can use PowerPoint to create an action maze. In an action maze, the user receives information on the first screen and has to choose a response among several. The chosen response leads to more information and more choices, and so on. Students can also use PowerPoint to make multimedia books for younger children, providing the story in a variety of modes (audio, text, and pictures) so that ELLs and other students with special needs can access the content.

Prezi differs from PowerPoint in that the template designs offered on the Prezi website are more colorful, interactive and creative than PowerPoint templates. Prezi templates are not linear; photo or text boxes are somewhat randomly placed on the page in the design template. When creating a Prezi slides can be seen on the left side of the template that is being edited. By using the slides option the content being presented can be created and rearranged during the editing process. As an educator make sure to sign into Prezi Education: <https://prezi.com/explore/education/> Logging into Prezi for Education offers teachers and students a free upgraded site.

What other ways can you think of to use Prezi or PowerPoint to support creativity? Brainstorm and list as many as you can. OpenOffice (<http://www.openoffice.org/>), and ThinkFree (www.think-free.com) include free alternatives for PowerPoint, and other presentation packages such as Hyperstudio have many of the same features as PowerPoint.

Tool CloseUp: KidPix

KidPix Deluxe, by Borderbound, <https://www.mackiev.com/kidpix/index.html> is versatile for children (and adults!) of all ages to learn to use quickly and easily. The software allows the user to draw using a variety of electronic tools, including a paintbrush, pencil, crayons, and spray paint can. Features include more than 600 stamps that students can include in their creations; categories include animals, events, backgrounds, and many more. Students can add audio and text to their pictures and make a slideshow or movie by adding the drawings to the slideshow maker. Users can choose how unwanted items are deleted and a special sound for each type (e.g., dynamite blows up the item with the booming sound). This can sometimes make destruction more fun than the creation, so teachers need to watch the use of this feature. Figure 5.8 shows the KidPix Deluxe interface and a partial drawing of a circus train car like the one Jamie was working on in the opening case.

Students can use KidPix to construct content-based slideshow and presentations, to illustrate a piece of music, to write books for younger students, and to experiment with color, sound, pattern, photos, and text.

What other tools could enhance students' access to an expression of creative thinking skills? Which assistive tools would be helpful for students with special needs?

Other presentation software ideas include Prezi <https://prezi.com> and PowToon <https://www.powtoon.com/index/>. These websites provide clear instruction for teachers and students to prepare creative, colorful, instructive presentations. Each of these sites can be used in place of PowerPoint to create the same lesson above.

SAMPLE LESSON: CREATIVITY

A teacher at the high school in Ms. Groves's district, Ms. Farelli, supports her students in thinking out of the box, imagining, and developing their creativity in many different activities throughout the day. She often adapts lesson plans found on the about.com site, particularly their inventors' site, to take her students through the stages of the creative process and to practice a variety of strategies. One of her (and the students') favorite lessons helps students find and create solutions to classroom problems.

Ms. Farelli has used the Lesson Analysis and Adaptation Worksheet to help her explore the lesson. She concluded that these changes make this lesson more effective:

- Although standards for the lesson are not mentioned, she focuses on general creativity standards across content areas.
- Some of her students are more hesitant to participate than others, so she gives students the choice to brainstorm in small groups, either face to face or anonymously on the computer. This provides a scaffold for students who need it and gives all students more chances to participate. This also allows students more chances to communicate and use other skills.

ACTIVITY: PRACTICING INVENTIVE THINKING WITH THE CLASS

Mary Bellis, 2007

http://inventors.about.com/od/lessonplans/a/creativity_3.htm

Before your students begin to find their own problems and create unique inventions or innovations to solve them, you can assist them by taking them through some of the steps as a group.

Finding the Problem

Let the class list problems in their own classroom that need solving. Use the “brainstorming” technique. Perhaps your students never have a pencil ready, as it is either missing or broken when it is time to do an assignment (a great brainstorming project would be to solve that problem). Select one problem for the class to solve using the following steps:

- Find several problems.
- Select one to work on.
- Analyze the situation.
- Think of many, varied, and unusual ways of solving the problem.
- List the possibilities. Be sure to allow even the silliest possible solution, as creative thinking must have a positive, accepting environment in order to flourish.

Finding a Solution

- Select one or more possible solutions to work on. You may want to divide into groups if the class elects to work on several of the ideas.
- Improve and refine the idea(s).
- Share the class or individual solution(s)/invention(s) for solving the class problem.

Source: ©2007 by Bellis (http://inventors.about.com/od/lessonplans/a/creativity_3.htm). Used with permission of About, Inc. which can be found online at www.about.com. All rights reserved.

- Ms. Farelli provides a handout with instructions for students to follow as she explains the task, and she will have students model so that everyone understands. This supports ELLs and other students with special needs in accessing the instructions and participating.
- Student groups are asked to support their solutions with a PowerPoint presentation, a poster, or another product that clearly explains their solution.
- For those students who need help finding resources to support their solutions, she provides some general resources.
- No assessment is mentioned in the lesson, but Ms. Farelli observes and questions as the groups work. She notes who is participating and who is not, how the groups interact, and what roles students take in the process. She intervenes where necessary so that each student has input. Finally, she will listen to the culminating discussions and wrap up with a give-and-take about creativity with the students.

Ms. Farelli does not give grades for this lesson, but she does provide each student with comments about both their process and outcomes. She believes that the changes she will make to this lesson will make students more active, support their learning more clearly, and make the lesson memorable so that students will use what they learn.

Like the other learning goals addressed in this text, creativity is important to the lives of teachers and students. Although creativity cannot be taught per se, its development can be supported in an enriched, respectful environment that values creative thought. Creativity, as you will see in chapters 6 and 7, is an especially crucial attribute for students to become effective critical thinkers and problem solvers.

Chapter Extensions

Adapt

Choose a technology-enhanced lesson for any subject area and grade level from the lesson plans at Thought Co <https://www.thoughtco.com/creative-thinking-lesson-plans-1992054> Use the Lesson Analysis and Adaptation Worksheet from chapter 1 to consider the lesson in the context of creativity. Use your responses to the worksheet to suggest general changes to the lesson based on your current or future students and context.

Practice

1. Test a tool. Choose one of the tools mentioned in this chapter. Try it out, and then describe how you might use it to support creativity for a diverse student population.
2. Brainstorm ideas. Write down as many ways as you can think of how to help students develop an ongoing respect for people and ideas in your classroom.
3. Create an assessment. Develop a rubric with specific criteria that address creativity for one of the activity examples in this chapter.

Explore

1. Integrate creativity into a lesson. Review a lesson that you have written recently. Describe opportunities for creativity that are included in the lesson. If there are none, describe how you might include such opportunities and how you might support them with technology.
2. Think about creative teaching. Pick a content area and theme (e.g., science and the water cycle), and brainstorm as many innovative ways to present it as you can. Then, brainstorm ways that technology can help you present your theme.
3. Match techniques and tools. Look at some of the creative thinking techniques from the technique Web sites mentioned in the chapter. Choose 5 techniques that sound useful for your current or future students and your teaching context. Make a T-chart, listing on one side a brief description of the technique, and on the other side an electronic tool that might help you and/or your students to learn and practice that technique. An example is shown here.

Technique	Tool
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<i>Example:</i> Brainstorming	Text Chat
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Student Application

The following assignment is intended to help individual students go beyond what they've read and apply the information from the chapter. After reading chapter 5 students will have a broad overview of content learning and how to apply it. This application assignment will delve more deeply into content

learning and how technology, more specifically Makerspace websites and ideas.

Assignment

Design a creative thinking project based on a Makerspace classroom plan. Please log into <https://www.makerspaces.com/what-is-a-makerspace/> in addition, please also look at two of the Makerspace idea sites, posted below, to discover what a Makerspace is and how to create one.

Please make sure to include the questions with your responses.

Imagine that you are a teacher in a new classroom, your task is to create a Makerspace area for your students. What would your space look like? Please post your responses to the following questions along with the links to the websites you've chosen, from the list above.

Makerspace Overview

1. Using Makerspace ideas, based on your own teaching interests, write a short paragraph describing how you would create a Makerspace area in your classroom. Describe the Creative Thinking Process, found in the Textbook and how it fits within your design ideas.
2. Describe what your area would look like and what activities would be included. Draw a picture of your space and the activity areas you plan to include and post it on this Canvas assignment page, along with your assignment questions. Please also bring your drawing to class.

Questions

1. Why is it important to incorporate a Makerspace area into your classroom? What will it offer your students that other classroom activities do not?
2. List and describe 2 projects that your students would be able to create.
3. List materials you would need for each of these projects.
4. How would you collect these materials? Purchase, donation?
5. How would you change your room configuration to accommodate the Makerspace area?
6. List and describe 2 different technologies that you would incorporate into your Makerspace area.
7. Find and post the link to a YouTube or Vimeo, that will help you explain one of your Makerspace project ideas to your students.
8. How would a classroom Makerspace, as a whole, engage your students?
9. When considering the textbook and the characteristics of Effective Creative Tasks, discuss the following and how they each apply to the concept of a Makerspace.
 - A. Focus on content
 - B. Emphasizing divergent thinking
 - C. Incorporating creative strategies

Maker Space Website ideas



<https://www.makerspaces.com/what-is-a-makerspace/>



<http://classroom-aid.com/2013/03/14/16-resources-for-makerspaces>



<https://www.edutopia.org/blog/fostering-creativity-with-makerspaces-nicholas-provenzano>



<http://makeymakey.com/gallery/>



<http://makered.org>

6

CHAPTER 6 INSTRUCTOR'S GUIDE

The instructor's guide contains several useful tools, discussion questions, a case study, review questions, additional chapter assignments, lesson examples and a student application assignment. As the Instructor, pick and choose which of these materials work for you or you may decide to use our ideas and create your own. This guide is intended to help solidify the information from the chapter and help you as an instructor implement the application of these materials.

Discussion Questions

The following questions are intended for use in a small group discussion setting. Please use these questions to help the students understand the important concepts in this chapter. To add interest to class discussions, copy and paste some or all of these questions into a Nearpod <https://nearpod.com> or PowToon, <https://www.powtoon.com>, to create a fun, user friendly student-voice based review.

1. In your own words describe problem solving and its use within the classroom.
2. With a partner discuss several problem based subjects that you are aware of.
3. Which problem based subjects are you passionate about?
4. Describe the difference between open ended and closed ended structure.
5. Discuss the Inquiry Method with a partner.
6. List the steps of the Inquiry Method and ways in which this method can be used in the classroom, in Science or any other subjects.
7. In your small groups, discuss problem-based learning and how it applies to your teaching style?
8. Discuss various process methods for researching and discovering answers to the problems discussed in your small groups.
9. How do the common core standards fit with and enhance problem based learning?
<http://www.corestandards.org>

Case: Super Store

As you read the following scenario, note how the teacher guides the students during the inquiry process.

A major discount retailer wants to build a giant new superstore in the small rural town where Ms. Lee teaches eighth-grade social studies. Ms. Lee's students have been exposed to picketers, mailers, publicly posted flyers, and letters in the local newspaper both supporting and opposing the superstore. On one side, some local small businesspeople are worried that they will be put out of business by the

giant, and other town citizens are concerned that their way of life will be ruined by extra traffic, noise, pollution, and low-paying jobs. Others who oppose the superstore complain that the low wages that the store pays will mean fewer good jobs in town. On the other side, the Chamber of Commerce, some educators, and other citizens anticipate more revenue to pay for schools and roads, and some people are looking forward to having a nearby place to shop and save money.

Ms. Lee's students are also divided on the issue, echoing the partisan arguments of their parents and friends. Her students tell her that they would like to know the "real story." Ms. Lee decides that this is an excellent opportunity for students to study a large range of economic, political, and social issues that directly impact them and their families. Ms. Lee agrees to plan a project for the students to help the town solve the dilemma over whether the superstore is in the best interests of the town. During the project she will focus on problem solving and inquiry and use technology to support both.

Case Review Questions

Answer these questions about the case. There are no right or wrong answers—the goal is for you to respond before you read the chapter. Then, as you interact with the chapter contents, think about how your answers might change.

1. What prior content and language knowledge do the students need to solve this problem?

2. What process should the students follow to find a solution to the problem?

3. What should Ms. Lee's role in the project be?

4. What role can technology play in helping the students to solve their problem?

Ms. Lee understands that this issue is important for her students to understand, and that it also presents a learning experience that will help them gain in content knowledge, language, and skills. The goal of this chapter is to help you to understand how teachers and technology can support student problem solving. After reading this chapter, you will be able to

- Define problem solving and inquiry.

- Understand the interaction between problem solving and other instructional goals.
- Discuss guidelines and technologies for encouraging effective student problem solving.
- Create and adapt effective technology-enhanced tasks to support problem solving.
- Assess student technology-supported problem solving.

When you have completed this chapter, which NETS*T will you have addressed?

Like critical and creative thinking, problem solving is not an easy thing to teach. However, educators believe it is crucially important that students gain these skills. The standards that support this goal in every content area demonstrate the significance of problem solving. See the Meeting the Standards feature on the next page for an overview of these standards.

Tools

There are many tools that can support parts of the problem-solving process if the teacher has the time and desire to find and evaluate them. Many of these are described in the Tools section of this chapter. Microsoft Student provides many of these supports in one software package, saving teachers time and effort (but not money—the package costs about \$70).

Student features four main tools that serve a variety of purposes. These include:

- Encarta Premium. Much more than an electronic encyclopedia, this tool contains 300 video clips, 66,000 articles, over 25,000 photos, an atlas, thesaurus, dictionary, and sound and music clips. It also includes Encarta Kids with content for younger learners. This is a very thorough resource for inquiry about thousands of topics and a good place to start gathering information on a project.
- Math tools. The math tools include an online graphing calculator, an equation library, and homework help. Students can use these tools not only for solving math problems but for graphing information to support problems in other areas.
- Learning essentials. This section includes tutorials for the Microsoft Office Suite, writing tutorials, and templates for writing in different genres. Students can get support for presenting their inquiry and problem-solving projects.

Student has additional features such as foreign language tools, but more important than what it has is what it can do. First, Student can help support students during inquiry by providing resources in a variety of modes. By providing information in formats from audio to video, Student makes it possible for ELLs and students with different learning preferences to access the content.

Second, tutorials such as that showing how to make diagrams in Microsoft Word can help students to organize, synthesize, and present information during PBL. In the same way, templates can assist students in preparing and presenting their problem solutions. Other tools scaffold student learning during PBL and make it possible for students with different language backgrounds to communicate.

Another benefit is that, because the tools are bundled, students know where to go to find what they need.

There are problems with the software. For example, it runs only on the Microsoft operating system, and teachers need to spend time learning the tools to understand how best to use them with students. In spite of this, Student is a powerful software package that can support effective problem solving and inquiry in K-12 classrooms.

Based on the description of Student, what other characteristics of PBL does it support? Would you try this software? Why or why not?

SAMPLE LESSON: PROBLEM-SOLVING

After they complete their research on the topic, Ms. Lee's students will create a Web site focusing on the superstore issue. They will use the site to collect additional information and opinions. However, before they start Ms. Lee wants to reinforce concepts about fair use and copyright. She finds a lesson that might work at PBS's Teacher Source (<http://www.pbs.org>).

INTELLECTUAL PROPERTY IN THE DIGITAL AGE

Grade Level:4–8, 9–12

Subject:Technology, Arts, Current Events

Introduction: Many people share the misconception that information found on the Internet is free and for all to use without permission. However, by collecting many images, sounds, and readings when creating a Web site you may be violating a person's intellectual property (IP) or copyright.

1. Begin this lesson by introducing your students to the concepts of intellectual property and copyright to your students.

Definitions:

- Intellectual property represents the property of your mind or intellect. Types of intellectual property include patents, trademarks, designs, confidential information/ trade secrets, copyright, circuit layout rights, plant breeder's rights, etc.
- Copyright protects the original expression of ideas, not the ideas themselves. It is free and automatically safeguards your original works of art, literature, music, films, broadcasts and computer programs from copying and certain other uses.

1. Explore these questions with your students: How are the two concepts similar and different? What are the various types of intellectual property? Why do laws protecting IP exist? How has the revolution in communications technology over the past decade complicated issues surrounding IP?

You and your students may want to use these resources for more information:

- This Website focuses on technology and copyright law <https://copyrightandtechnology.com>
- Crash Course in Copyright, YouTube video <https://www.youtube.com/watch?v=Tam0j84j64I>
- Intellectual Property law <https://cpip.gmu.edu>

Ms. Lee likes to see that the lesson provides a guideline but is not too prescriptive of what students should do. She uses the Lesson Analysis and Adaptation Worksheet (found in chapter 1 on page 33 and in the Lesson Planning module of the Companion Website) to figure out what she needs to do to make this lesson work for her students. She decides to make these adaptations based on her analysis:

- Because there are no standards or objectives, she will add these. She particularly wants to focus on the NETS*S that recommend that students understand and practice responsible uses of technology and that they use technology resources for solving problems.
- Rather than just answer questions, Ms. Lee will ask her students to research some answers and compare them with what classmates found. Then she will ask them to develop a set of guidelines, in their choice of medium, for the class to refer to when they are using online resources. This addition will support student inquiry, communication, critical thinking, production, and creativity along with content learning and problem-solving.
- Ms. Lee will brainstorm with students the possible sub-questions that will help them answer the questions in the lesson. She will assign each student dyad to find information on one sub-question, keeping the students active and each making a contribution.
- Technology is used as a tool in this lesson and helps students discover a variety of viewpoints and resources. However, to make sure that all students can access the resources, she will add both print and electronic references at a variety of levels for students to choose from.
- Ms. Lee will use the guidelines that students create as part of her assessment, and she will continue to observe how well her students follow the guidelines as they create their Web pages for the superstore project.
- Ms. Lee believes that, with the additions she will make, this lesson will support the objectives and provide her students with practice in many skill areas.

Adapt

Choose a lesson for your potential subject area and grade level from the Internet4Classrooms page of Integrated Technology Lesson Plans (<http://www.internet4classrooms.com>). Use the Lesson Analysis and Adaptation Worksheet from chapter 1, consider the lesson in the context of problem-solving. Use your responses to the worksheet to suggest general changes to the lesson based on your current or future students and context.

Practice

1. Determine tool levels. Apply Gordon's three-level scheme to the tools listed in this chapter. Which level would each tool be appropriate for? Why?
2. Review a tool. Review one of the tools described in the chapter, including tools to spot plagiarism. Explain how it addresses problem-solving and inquiry and how you might integrate it into your

current or future classroom.

3. Practice planning. Review the sample activities in this chapter. Choose three, and describe how you could integrate reading and writing into the activities to promote effective problem-solving.

Explore

1. Create an activity. Outline a WebQuest, ThinkQuest, WIP, or other inquiry or problem-solving activity. Describe each stage briefly but clearly.
2. Create a standards-based task. Choose a national or state standard for your subject area and grade level. Write a problem based on that standard following the characteristics described in the chapter, and then evaluate the problem using the characteristics of effective tasks.
3. Turn theory into practice. Use the adapted Figure 6.2 on page 161 to develop a classroom lesson based on the PBL process. On the chart below, fill in the "Lesson" column with ideas for each step.

Step	Example	Lesson
1.Contextualize the question	Ask, "What is the question here? What should we do about it"	
2.Develop objectives	Figure out the goal and the skills the task will meet.	
3.Review background	Explore materials and tools that focus on the problem.	
4.Write the problem	Be specific about student roles and responsibilities	
5.Develop scaffolds	Create documents, mini-lessons, and other helps	
6.evaluate student needs	Review students' current level of knowledge and skills	
7.Implement	Provide clear instructions and ongoing observation and feedback	

Additional Student Application

The following assignment is intended to help individual students go beyond what they've read and apply the information from the chapter. After reading chapter 6 students will have a broad overview of problem-solving and critical thinking and how to apply it. This application assignment will delve more deeply into the uses of technology in problem-solving, more specifically, online research sites and virtual field trips.

Choose a specific grade for this lesson design. Choose either project 1 or 2.

As a teacher, you will need to guide your students through the problem-solving process. The following application projects will guide you through the process of designing a simple lesson.

Project 1

Think of a problem that your students may have experienced or seen in the local or national news, such as a controversial business or a social issue, which causes community or nationwide debate.

1. Write a brief description of the problem or issue.
2. Who does this particular problem affect?
3. List 2 objectives you would give your students that represent the goal you wish to achieve in your problem-based assignment.
4. Outline ways in which you could encourage problem-solving in your classroom with this problem as the central discussion point.
5. Describe what an open-ended or loosely structured problem is. How does this apply to this assignment?
6. Considering the example in the text, describe the scaffolding you would need to make this assignment successful for all of your students.
7. What technology tools could you incorporate to accomplish this problem-solving dilemma? How would you use these tools to find the information needed for the problem you are researching?
8. Please list two additional websites that you found useful.
9. Describe how you would differentiate your lesson for ELL and Special Ed students.
10. Discuss how you would conclude the process regarding the problem discussed in this assignment.
11. How would you assess the success of this project?

Project 2

Find a virtual field trip for your students that explores problem-solving in the present or in history. Use Nearpod, Google Expeditions or Spiral.ac to design your lesson. After you've chosen a virtual field trip from one of these sites, please answer the following questions.

1. Which virtual tour did you choose?
2. Describe how this tour fulfills the problem-based learning requirement.
3. Outline ways in which you could encourage problem-solving using this virtual tour.
4. Describe what an open-ended or loosely structured problem is. How does this apply to this assignment?
5. List 2 objectives you would give your students that represent the goal of your problem-based assignment.
6. Considering the example in the text, describe the scaffolding you would need to make this project successful for all of your students.
7. What other technology tools could you incorporate to accomplish this problem-solving dilemma? How would you use these tools to find the information needed for the problem you are researching?
8. Describe how you would differentiate your lesson for all of your students, including your ELL and Special Ed students.
9. Discuss how you would conclude the process regarding the problem discussed in this assignment.
10. How would you assess the success of this project?

Website tools:



<https://nearpod.com/nearpod-vr>

Google Expeditions

<https://edu.google.com/expeditions/>



<https://spiral.ac/teacher>

CHAPTER 7 INSTRUCTOR'S GUIDE

The instructor's guide contains several useful tools, discussion questions, a case study, review questions, additional chapter assignments, lesson examples and a student application assignment. As the Instructor, pick and choose which of these materials work for you or you may decide to use our ideas and create your own. This guide is intended to help solidify the information from the chapter and help you as an instructor implement the application of these materials.

Discussion questions

The following questions are intended for use in a small group discussion setting. Please use these questions to help the students understand the important concepts in this chapter. To add interest to class discussions, copy and paste some or all of these questions into a Nearpod <https://nearpod.com> or PowToon, <https://www.powtoon.com>, to create a fun, user friendly, student-voice based review.

1. Discuss student productions as a teaching tool.
2. In small groups discuss student productions you remember from your childhood. Which projects stand out? Why?
3. How can student productions benefit your classroom? Please discuss each of the benefits listed in the chapter:
 - Individual and group responsibility
 - Critical thinking, reasoning and creativity and planning experience
 - Developing strong communication skills
 - Developing cross cultural understanding
 - Visualizing and decision making
 - Discovering how and when to use technology and which tools are appropriate.
1. Discuss how student productions can fit in with common core requirements?
2. Brainstorm in small groups several student production ideas you would like to use in your future classroom.
3. In your small groups discuss how you might sell your student production idea to your administration.
4. Discuss production tools, found in the chapter, that you might use in your student production idea.

Case Study: See You on TV!

As you read the following scenario, note both the processes in which students are involved and the products that they generate.

Students in Ms. Farber's fifth-grade class are working on a media literacy unit that will help them to become more critical consumers of media. Ms. Farber has incorporated standards-based content and language goals across the unit and has planned carefully so that all students are active participants in their learning.

Part of the unit is a five-stage project focusing on one area of media—television advertising—with the goal of producing infomercials, or long commercials. In order to focus their infomercials, students first researched and then designed new products that they believe they can sell to other fifth graders (an authentic audience) using persuasive techniques (Stage 1). With the use of graphics software and copyright-free clip art from the Internet, student teams have developed a three-dimensional model and a one-paragraph description of their products for use in their 5-minute commercials (Stage 2). Teams are currently in the process of writing scripts using both print and electronic resources (Stage 3). Each team must spell-check its script and check it against both the project grading rubric and an “infomercial checklist” before asking another team and then Ms. Farber to evaluate it. As the unit progresses, readings, class discussions, skills-based lessons, and other exercises and activities inform the students' understanding of media literacy and the development of student products.

During script development, Ms. Farber observes one team reviewing sample infomercials using the DVD player, members of different teams using two of the three class computers to do research, and most of the students working with great animation on their scripts around their desks. Because each team is required to gather feedback from at least one other team about their script, she also sees a lot of intergroup interaction.

In future classes, when the scripts are drafted and have passed evaluation by another team and Ms. Farber, they will go into production (Stage 4). This stage requires the most advanced technology use. Students will prepare whatever scenery and props they need and use one of the school's digital cameras to film their segment. Students will then use either iMovie (Apple) or Shotcut, free video editing software to edit their infomercial, add any text, and burn it (save it) to a digital video disk (DVD) (Stage 5).

Final versions of the infomercials will be shown to the other fifth-grade classes, who will provide feedback on which products they would buy and why. After the project teams debrief, students will turn in an explanation of the assignment and a reflection on the different processes they experienced and ideas and skills they learned. They will include any questions they still have about any aspect of the project or unit.

Review Questions:

Answer these questions about the case. There are no right or wrong answers—the goal is for you to respond before you read the chapter. Then, as you interact with the chapter contents, think about how your answers might change.

1. What are some learning benefits that students might derive from creating this product?

2. What aspects of the process seem to be most important to student achievement toward the goals? Why do you think so?

3. What is the teacher's role in this project?

4. What role does the technology play?

Ms. Farber has chosen a specific process and product for the student media literacy project, but there are many other choices that she might have made. The goal of this chapter is to help you to understand the range of choices for student production by exploring why production is important to student learning and the many ways in which production can be supported effectively with technology. After reading this chapter you will be able to

- Define production.
- Describe the benefits of student production for learning.
- Explain the role of process in production.
- Discuss guidelines for supporting student technology-enhanced production.
- Describe technologies for supporting student production.
- Evaluate and develop pedagogically sound technology-enhanced production activities.
- Design appropriate assessments for technology-enhanced process and product.

When you have completed this chapter, which NETS*T will you have addressed?

The sample activities, tools, and student products presented in this chapter will help you understand

how to apply the standards described in this chapter and address the learning goals for student production. For common core standards that guide production and therefore the content of this chapter, see the Meeting the Standards feature.

SAMPLE LESSON: PRODUCTION

With sufficient scaffolding, time, and feedback, Ms. Farber's students were able to produce infomercials that demonstrated their understanding of persuasive techniques used in the media. During the project Ms. Farber's students were enthusiastically engaged. Ms. Farber wants to try another project with a relevant product. This time, she wants to focus on some of her curricular math goals. She searches the Web for good ideas and comes up with an idea by teachers Tom Scavo and Byron Petraroja from LessonPlanZ.com <http://lessonplanz.com> . Their detailed description made this math lesson sound like an effective and fun way to meet the standards (<http://www.corestandards.org/Math/>). She copies down the plan's outline:

ADVENTURES IN STATISTICS

Problem: Are the areas of classrooms in the sixth grade larger, on the average, than the areas of the fifth-grade classrooms?

Procedure:

- Students hypothesize what they think the answer to this question might be and document their responses.
- Discuss the practical applications of the ultimate findings.
- Talk about the length and width of the classroom and how to go about measuring it. Estimate these measures by sight and write down the estimates for future reference. Discuss what is meant by the area of the room and then compute using the above length and width estimates.
- Working in pairs, all students measure the length and width of the classroom. First one student from each team measures while the other records, and then they switch roles, measuring again. Record the two sets of measurements on data sheets. When all the teams have completed the measurement task, write the data on the black-board and compare. Note discrepancies between the measurement pairs. Take again those that cannot be attributed to measurement or round-off error.
- Arrange for the students to measure each of the fifth- and sixth-grade classrooms in the school with the same procedure followed earlier.
- Convert the data to common units and then use calculators to compute the area. Make sure students accompany all answers with appropriate units.
- Examine the data.
- Line graph the data. Then change the line graphs to bar graphs. Examine the graph data.
- Repeat the above lessons for number of students and compare the area to the number of students.
- Compute the average area of fifth- and sixth-grade classrooms and the average number of students, showing student work. Then compute average area per student.
- Prepare a presentation of the data (they invited the principal), each student team taking a different part.

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Ms. Farber can instantly see that students will be active and focused on an authentic task, and she likes that many scaffolds are provided in the form of teacher mini-lessons and worksheets. She decides to analyze the lesson with the Lesson Analysis and Adaptation Worksheet (found in chapter 1 on page 33 and in the Lesson Planning module of the Companion Website) to see ways in which the lesson might be improved. As a result of her analysis she decides to use this lesson, but to change it in the following ways:

1. Add the standards and curricular goals that apply. She sees that, in addition to math content standards, the lesson can help students meet goals for communication, problem solving, critical thinking, and even creativity in their final product. In addition, the lesson addresses a variety of literacies (technological, mathematical, visual) and student learning preferences.
2. Add additional resources. Instead of just their meter sticks, students can use a pedometer, a measuring tape, or another rule of their choice to measure. Ms. Farber will also make the computers available for students who want or need to use a spreadsheet to calculate, a word processor or drawing program to make their charts and diagrams, and presentation or other software to produce their final product. These choices help address the needs of a variety of students, from those who need more structure and support to more independent, gifted students.
3. Add more choices for the final product. Students can use the data to argue for or against any of the reasons they gave at the start of the lesson for the practical application of the lesson. For example, one group might create an action maze to help future students carry out the same calculations, while another might write a letter to the school board about overcrowding at their school.
4. Spell out specific assessments. Ms. Farber will observe her students, check their written work, and use a rubric to evaluate their final product. She will also ask the students to write a self-reflection of their process and product, and determine whether their final products should become part of their grade-level portfolios.

Ms. Farber believes that, with these changes, this lesson will be accessible to all of her students and that all of her students will have the opportunity to achieve the intended goals.

Adapt

Choose a lesson for your potential subject area and grade level from the technology-enhanced lesson plan site, Lesson Planet, <https://www.lessonplanet.com> or Kid Zone <http://www.kidzone.ws/plans/>. Use the Lesson Analysis and Adaptation Worksheet from chapter 1, consider the lesson in the context of production. Use your responses to the worksheet to suggest general changes to the lesson based on your current or future students and context.

Practice

1. Write objectives for a technology-enhanced project. Write specific content and language objectives for Ms. Farber's project. Share them with a peer and revise them as necessary. Use the "objectives" table from chapter 1 as needed.
2. Create student roles. Review the learning activity examples in this chapter. Choose three of the projects and suggest what roles you might create for students and who an authentic audience could be for each of the three projects.
3. Assess technology-enhanced learning. Choose one or more of the learning activity examples from the chapter and develop an assessment plan. Address who will be assessed, when, in what

categories, based on what criteria. Also suggest how you would generate an overall assessment for the project.

Explore

1. Create a production handout for students. On paper, use graphics, text, and any other modes you can to outline for your students a production project that you might use in your class. Include information that explains to students the content and process of the task. Add a brief description of how the task process will be accessible to all students, regardless of language proficiency, content knowledge, or physical abilities.
2. Create a quick reference for production software or hardware. One way to learn a piece of software or a technology is to make a reference to help someone else. Choose a piece of software or hardware that you might use in the production process in your classroom (see Table 7.2 for tool ideas). Explore your choice, examining the features and learning about the opportunities that it offers. Then create an explanation for students on how to use it. Be sure to make your reference appropriate for diverse learners.
3. Examine a production project. Choose a production project from a text, Web site, or other resource that is relevant to your current or future teaching context. Explain how the project you choose meets the guidelines and provides the opportunities mentioned throughout this chapter. Describe how it might be adapted to better meet the needs of all students and to use technology more effectively.
4. Create a production project. Review your content area standards and any other relevant standards. Choose a topic that works within these standards and other curricular requirements for your state or region and develop a technology-enhanced project around it.

Additional Student Application

The following assignment is intended to help individual students go beyond what they've read and apply the information from the chapter. After reading chapter 7 students will have a broad overview of student production and how to apply it. This application assignment will delve more deeply the uses of technology, more specifically, in designing your own ideas for a school production using examples and ideas from other classrooms.

Two Scenarios from local schools

Student productions can be a fun way for students and teachers to work together to create a final product that they will all be proud of. The following 2 examples are given to help you see how student productions can be used in the classroom.

1. The first example is, **School Store**, put on by the 4th graders at a local elementary school.

This program requires students to plan and set goals, in small groups, deciding what they want to produce or what service to provide at the store. They also decide what to charge for their product or service and figure out each of the needed items to produce their product. The dates for the School Store are set in advance, so the students must be prepared.

During the School Store each of the small groups work together to sell their products to the students

and parents visiting their store. The students work to get customers in their store by advertising and marketing their product to the customers. They might even elect one student in the group to bring in customers. Each person visiting is given school bucks to use to purchase items or services.

After the store project has been completed the students are responsible to count up the amount of school dollars they have earned and compare it to all of the other student's sales. They also compare their sales to the goals that were made at the beginning of the process.

1. The second example is, **Chanel 3 School News**, produced by 8th students attending the local Middle School.

The 8thgrade students work together each morning to produce a news program that is viewed by the entire school each day. The students are broken into small groups and given production jobs. At the beginning of the school year students apply for these jobs required to produce the news program. Jobs include: *News Anchor, Sports Caster, Camera Operator, Sound Supervisor, Editor etc..*

After the news is produced, it is edited by the students and put on the air for the enjoyment of the rest of the student body and staff.

Assignment

Compare these two student production ideas with the information you read in chapter 7. Choose one of these examples and answer the following questions.

1. Discuss how these 3 areas fit into student production. a.
Student benefit, b. Teachers roll, c. Scaffolding for Ell and SPED students
2. Consider the 3 stages of production, planning, development, and evaluation. How do you think the teachers in charge of these projects implemented these tools?
3. Please describe 2 objectives you would fulfill using student production.
4. What content areas can be covered using this activity?
5. List 2 production tools you might use in this the student production process. How do you think these tools were used in the student production you chose to look at?
6. List several benefits to students through this student production.
7. Reflect on how would you assess the success of this production?

Activity

Using one of the above ideas and questions as a jumping off point, design your own student production. Please use the three-stages of production and five-stage project guidelines, found in the textbook, to direct your process.

8

CHAPTER 8 INSTRUCTOR'S GUIDE

The instructor's guide contains several useful tools, discussion questions, a case study, review questions, additional chapter assignments, lesson examples and a student application assignment. As the Instructor, pick and choose which of these materials work for you or you may decide to use our ideas and create your own. This guide is intended to help solidify the information from the chapter and help you as an instructor implement the application of these materials.

Discussion Questions

The following questions are intended for use in a small group, discussion setting. Please use these questions to help the students understand the important concepts in this chapter. To add interest to class discussions, copy and paste some or all of these questions into a Nearpod <https://nearpod.com> or PowToon, <https://www.powtoon.com>, to create a fun, user friendly, student-voice based review.

1. In small groups, discuss some pros and cons to e-learning.
2. With a partner, discuss your personal experience with e-learning.
 - Did you enjoy your e-learning experience?
 - How do e-learning classes compare to face to face classes?
 - Does your learning style work better with an e-learning platform, face to face or blended classroom? Why?
1. With a partner discuss the difference between online learning, blended learning and face to face classroom models.
2. How do you see e-learning benefiting the classroom?
 - Explain how it can help meet learner goals.

- How would you develop some e-learning goals?

1. In your small groups look up one of the e-learning sites. Describe how you would evaluate and assess effective e-learning tools in your classroom. Copy and past the URL for the site you chose?

- What assessment tools are available?
- Is there a video or audio component to the tool?
- Is there a digital library available?
- List the content lessons available through this e-learning site.

1. After reading this chapter you should have found several e-learning tools and online resources. Please list and discuss 2-3 of these tools or resources that you read about.

2. programs you reviewed.

- Kahn Academy is based on flipped classroom instruction, what does that mean?
- List 3 pros and cons to the flipped classroom design.

8. How would E-learning/on-line programs help ELL and Special Ed students?

9. When considering online learning, would the use of tablets help or hinder the process?

Why or why not?

10. discuss e-portfolios and their benefits for your students. How would you use the e-portfolio model in the classroom?

Case: Long Way to Go

As you read the following scenario, note potential benefits and drawbacks of using technology to help students learn when they are physically separated from the teacher.

Jim Sanderson, the science teacher at Wedmore High School, is concerned that his four advanced

students are not getting the courses that they need for college preparation. He wants to offer Advanced Placement (AP) courses, but because of the school's rural location, small student body, and lack of resources, offering such courses is not feasible. Jim recently came across an article in a teaching journal about electronic learning (eLearning), instruction that uses technology to enhance learning, often when the teacher and students are not in the same location. The article noted districts that are partnering via video conferencing and other technologies to make it possible for students in schools like his to get the courses they need. Jim is excited about the idea of joining with other schools to offer AP science courses, and he has decided to learn more about it.

Jim discovers through his research that his district is part of the statewide K-12 telecommunications system that connects all of the districts in the state. He also learns that the technology class at his school is already using video conferencing technologies to meet with students in different locations. He sends a message out on an electronic discussion list for science teachers and receives replies from other teachers in rural districts around his state who are interested in collaborating on AP courses. Jim decides to develop a proposal to create at least one online shared AP course and present it to the principal as soon as possible.

Case Review Questions

Answer these questions about the case. There are no right or wrong answers to this chapter preview—the goal is for you to respond before you read the chapter. Then, as you interact with the chapter contents, think about how your answers might change.

1. What other information does Jim need before he writes his proposal?

2. What are some potential benefits of eLearning?

3. What are some potential disadvantages of eLearning?

4. How could Jim most easily teach and assess students who are at a distance from him?

5. If you were Jim's principal, how would you react to this proposal? Why?

Like many other teachers wanting to serve their students better, Jim is excited about the prospects that eLearning can offer his students, but he has just begun to understand what it involves. eLearning, particularly learning that takes place completely online, often requires students and teachers to have different skills and understandings than face-to-face classroom learning does. In addition, student needs are different in some ways, and to be effective, the techniques, approaches, and technologies used might also have to change. Teachers who may want to use aspects of eLearning need to be aware of the essentials before they get started. To this end, when you finish this chapter, you will be able to:

- Explain eLearning and how it can help meet learning goals.
- Discuss guidelines for creating eLearning opportunities.
- Describe eLearning tools.
- Develop and evaluate effective technology-enhanced eLearning activities.
- Create appropriate assessments for technology-enhanced eLearning activities.

When you have completed this chapter, which NETS*T will you have addressed?

Although the process may be somewhat different, the standards that address eLearning are not different from those that guide all student learning. For more on these standards, see Meeting the Standards: eLearning.

SAMPLE LESSON: E-LEARNING

The principal asked Jim to submit a sample lesson plan with his proposal for distance AP science courses. The lesson is to be an example of what might be posted to the electronic forum used for the distance courses. Because the students will see the lessons and use them to direct their learning, Jim needs to ensure the lesson is student-friendly. Jim understands that other teachers have created wonderful lessons for online learning and, after searching the Web, <http://www.iptv.org/exploremore> The stated common core state standards (<http://www.corestandards.org/ELA-Literacy/RST/introduction/>) addressed by this lesson include math standards such as problem solving, reasoning, connections, and skills (statistics); content reading standards such as variety of sources, information access, and evaluation; and writing content standards such as modes.

Following is the lesson Jim chose <http://sciencenetlinks.com/lessons/el-nino/>

EL NIÑO

Have you ever watched the evening news with your folks and wondered how the weather person could

have been so wrong? You wore shorts to school that day only to find yourself freezing during lunch. Predicting the weather is a very difficult task. The many factors which impact your daily local weather can be thousands of miles away, so Meteorologists use a variety of different remote tools including satellites and buoys to help them make predictions. These experts make their predictions by building models using historical and current data.

El Niño and La Niña cycles are examples of these complex patterns. In this investigation, you will learn more about El Niño and La Niña cycles, and how they impact the weather in your area. To accomplish this task, you will be logging into one of same ocean buoys that scientists use to develop their models.

Your Task

You will be part of an expert team. Your team will be responsible for collecting data, organizing it in an appropriate graphic form, and analyzing it for the purpose of making weather predictions in your community. After making your prediction, you will write a speculation paper that details how you reached your conclusion. Your last task will be to share your findings with the scientific community.

As winter approaches, you will be on the hot seat, and you'll get a taste of what it's like to be a weather person. To be successful, you need to ask great questions, seek out the answers, develop new relationships, and take a stand.

The Process

Your team will be taking a seven-step approach to accomplishing the project. You will begin by learning more about El Niño and La Niña. After gaining a solid understand of these cycles, you will log into an ocean buoy and begin gathering your data and building a model. Your final task will be to craft an effective speculation paper about the coming winter, and share your findings with the scientific world.

Step 1: In the news

El Niño and La Niña cycles have a tremendous impact on the world's weather. It is hard to believe that ocean water temperatures in the Pacific Ocean can impact mid- America states, but the national news organizations have reported on the extensive impact of the cycle. Read the two articles below, and write a short summary of each one.

- La Niña leaves states high and dry – CNN News
- Flotilla of sensors to monitor world's oceans – CNN News

Step 2: Background information

Split up and assign each member of your group one of the Web pages listed below. Af- ter exploring the Web pages individually, get back together in your group and answer the following questions.

1. What is the difference between El Niño and La Niña?

2. Why is predicting these cycles important?
3. What are the possible impacts on weather due to a La Niña cycle?
4. What are the possible impacts on weather due to an El Niño cycle?
5. Is the earth always in either an El Niño or El Niña cycle?
6. Write and answer four additional questions that you believe would help people understand the El Niño and La Niña Cycles.

Resources

- About La Niña and El Niño – Climate Prediction Center
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml
- Global La Niña Impacts – Climate Prediction Center
- El Niño Impacts – Climate Prediction Center
- El Niño Basics – Climate Prediction Center

Step 3: Real-time data

It's time to start gathering sea surface temperatures (SST), so your team can begin to build a useful model. You will be using a buoy located at 110 degrees West and 0 degrees North. You will begin by gathering today's real-time data, and then adding that value to the temperatures for the last 14-days.

Current Real-Time Data

Java Applet #1

Java Applet #2

Last 14-days

(Make sure you use the data from the buoy at 110 W)

1. Use the link above to collect the today's daily (SST) for the 110 W 0 N buoy. (Note: When you place the mouse on the correct buoy, the window below will show the real-time information.)

2. Access and print the data for the last 14-days.
3. Calculate anomaly for each day. (Mean SST Values)
4. Place the data and calculations in a well-constructed table. Be sure to include a table title, column headings, and units.
5. Create a line graph for both the SST data and your calculated anomalies. (Example anomaly graph | Example SST graph)

Step 4: Historical model

Scientists have been tracking SST for many years, and it has allowed them to create a historical model that helps them predict El Niño and La Niña cycles. Use the link below to answer the following questions:

- Which two years show the greatest “positive” anomalies?
- Which two years show the greatest “negative” anomalies?
- Compare the anomaly graph you created in step 5 with the historical anomaly graph. Does it look like the current year is either an El Niño or La Niña cycle?
- How could you make your model a better predictor of the cycle? [Historical Anomaly Graph - TOA/TRITON](#)

Step 5: Temperatures and participation

The buoy we have been tracking is several thousand miles away, so it is hard to believe that sea surface temperatures can have an impact on your local weather. Use the links below to investigate how the El Niño and La Niña cycles impact your local weather. You may want to split up the links between each of your team members, and allow each individual to become a site expert. Be prepared to use this information when you write your final speculation paper.

- [La Niña Seasonal U.S. Temperature & Precipitation - Climate Prediction Center](#)
- [Seasonal Mean Temperatures and Precipitation for the United States during Strong El Niños - Climate Prediction Center](#)
- [Words of CAUTION](#) - by William S. Kessler NOAA / Pacific Marine Environmental Laboratory

- [Cold and Warm Episodes by Season](#) – Climate Prediction Center

Step 6: Speculation

It's time for you to take a stand. The model you developed in step 5 was only for a 15- day period, so you may also want to extend your graph to include a longer period of time. You can access additional SST by visiting the TOA / TRITON Data Delivery System. (Note: Make sure you are gathering data from the correct buoy.)

Is the world currently in an El Niño or La Niña cycle? What are your predictions for temperature and precipitation in your local area? You will be required to provide solid support when making your case. Your group needs to work together to reach consensus. After your group has reached consensus, your task is to construct a solid speculation essay, so you may want to read a few [Tips on Writing Speculation Papers](#). You may also want to view a possible grading rubric before beginning.

Step 7: Share your prediction

Your last step is to share your speculation with the world. Access the Climate Prediction Center Feedback Form, and cut and paste your paper into the form. Maybe you'll hear back.

Conclusion

Good Luck! Remember, luck only occurs where opportunity and preparation meet. Read, write, gather data and create your model with care. This winter you may actually live out your speculation.

Source: Project Design Team: Keith Nuthall, Cindy DeClercq, and John Windbury. Poway Unified School District, Poway, California.

Jim read the lesson carefully to analyze its appropriateness for the ninth/tenth-grade AP course he is envisioning and to adapt it to his teaching context. He completed a Lesson Analysis and Adaptation Worksheet found in chapter 1, conclude these things about the lesson:

- The standards, objectives, and task are aligned.
- The standards and objectives are appropriate for ninth/tenth graders. The NETS*S could be mentioned, but technology is also mentioned in the content standards.
- In each of the steps students are asked to search for and analyze data. The overall project goal is to create an informed speculation, an important skill.
- Graphs and data charts address visual literacy; students use technology in new ways; students use a variety of media—a real strength of this lesson.
- This lesson addresses all the learning goals through its emphasis on working in teams, coming to consensus, developing summaries and tables, searching for data to answer the question, and

delivering a product to an authentic audience.

- The Web materials/resources in the lesson are not marked for reading level or content. There is limited variety in materials since almost all of them are other Web sites. This needs to be expanded so that all students can access them at an appropriate level.
- Roles are not outlined specifically—the students need more guidance here. A good connection is made to real life in both the introduction and the conclusion. “How does weather work?” is an essential question.
- The raw data sources are completely authentic, as are the news articles. The communication supported by the technology makes the task easier for most students, but ELLs may need other types of input. It is unknown whether the students will learn faster, but they will probably be very engaged, so they may. The goal of understanding is foremost.
- The vocabulary and instructions are repeated, which helps with comprehensibility. However, some instructions need more explanation. There need to be more offline resources and models of finished products. Choices of resources would help students work in different ways, but more choice in other areas would also help.
- The rubric is too simple and does not explain clearly what is required. It seems to focus as much on writing as content—maybe these should be separate rubrics so that the focus is on the thought process first. It would be useful for students to help with the rubric creation, but that might be difficult from a distance. Maybe they can write a reflection based on what they see as the main points of their work.

This lesson has many outstanding aspects. However, based on his analysis and his knowledge of his students, Jim decides to make some small but important changes to the lesson. He especially wants to make sure that his adaptations meet the needs of the ELLs and other students with challenges who will take the course. He decides to make these changes based on his analysis:

- Link content words that some students might need to have explained (such as “remote,” “cycle,” and “historical”) to an online dictionary.
- Boldface important words such as “buoy” so that students will notice them.
- Bullet the content of the Task section to separate the goals and make it easier to read.
- Create a link to simple instructions for summary writing.

- Add models of the assignments.
- Annotate the Web links for reading level and content.
- Add additional resources such as books, magazine articles, and links to scientists.
- Include more graphics that help explain the goals and content of the lesson.
- Provide detailed suggestions for assigning roles within teams.
- Create a new rubric that includes more specific guidelines for each part of the task, and include guiding questions for students to reflect on their learning. Also include a rubric for discussions, such as:

Quality (Do you show reflection in your posting? Do you integrate readings, resources, and activities? Do you refer to your experiences and others' ideas? Do your comments add something to the discussion?)

Support (Do you provide evidence for your assertions?)

Professionalism (Do you get to the point? Do you use strategies to enhance others' understanding [e.g., give examples]? Are you a positive and supportive participant? Do you welcome different opinions and perspectives? Do you show respect to others in the discussion?).

Jim also decides to note places where the teacher will provide direct facilitation; how chat, video, and other tools of the learning environment will be integrated into the assignment; and how course management issues will be addressed. With these changes, Jim feels that this lesson will work well not only for his students but for students from other classrooms participating in the online ninth/tenth-grade AP course.

Adapt

Choose a lesson for your potential subject area and grade level from the Lesson Plan Library at Discovery Schools (<https://school.discoveryeducation.com/lessonplans/tech.html>) Use the Lesson Analysis and Adaptation Worksheet from chapter 1, consider the lesson in the context of blended or completely online e-learning. Use your responses to the worksheet to suggest general changes to the lesson based on your future students and context.

Practice

1. Give online instructions. Using a classroom document in which you have outlined instructions for students or a lesson that you have created, write specific instructions that students could follow in a setting without immediate access to a teacher. Use the examples in the Guidelines section of this chapter. Check to see if a classmate can follow the instructions exactly as you intended

without your help, and if not, revise them.

2. Review an e-learning tool. Choose an e-learning tool mentioned in this chapter. Go to the ISTE Web site and follow the instructions to choose an appropriate evaluation form for the tool you choose, <https://www.iste.org/explore/categorylist?code=Tools>. Use the form to review the features and uses of the tool. Write a short reflection about your findings.
3. Interview a teacher. After reading this chapter, what questions do you have? List them. Now, interview a teacher who you think has the experience or understanding to answer your questions. Report your answers to the class.
4. Develop an ePortfolio rubric. First, list a goal for the portfolio and create a brief table of contents. Then use one of the tools mentioned in this text to develop a rubric to assess the expected contents.

Explore

1. Avoid plagiarism. Brainstorm with your classmates how teachers might ensure that the assignments turned in have actually been completed by the student rather than someone else. Check online for solutions that other teachers have found and share them with your class.
2. Reconstruct an activity. Choose a lesson you have developed or one that you find for your content and grade level on the Web, Website examples: <https://www.education.com> and <https://www.scholastic.com/teachers/lessons-and-ideas/> Using information from this chapter, examine the activity. Are there parts of it that are too high in content and not high enough in process? If so, revise the activity. If not, explain why the level of process in the activity would be appropriate for e-learning.
3. Explore resources. Find a technology not listed in this book that could be used for eLearning. How can this tool support e-learning? Your answer should contain an explanation of the instructional and learning strategies, pedagogical models or constructs, and other learning technologies that could support e-learning with this tool.
4. Create an ePortfolio assignment. Revisit the standards for your grade level and content area(s). Outline requirements for an ePortfolio that would help your future students show how they have met the standards.

Additional Student Application

As you have discovered from each of the previous chapters application sections, the intention is to go

beyond the chapter and apply what you have learned. Put on your teacher hat and spend some time exploring one of the e-learning portfolio option. Please answer the following questions to develop a plan for the classroom.

Instructions

Use one of the websites or apps listed below to design an e-portfolio lesson. Design your lesson based on the grade level you are interested in working with. Post the URL for the e-portfolio site you chose. Please answer the following questions to create your lesson design.

1. Why did you choose this e-portfolio site?

- Why did this site appeal to you?
- Is this site user friendly and will your students find it easy to navigate?

1. How does the creation of an e-portfolio benefit students and enhance online or blended learning?

Design a simple lesson plan using on the following questions.

1. Instructional Plan: (Purpose for the lesson)

2. Alignment to NETs, (list the NETS standards that apply to e-portfolio creation)

3. List 1 NET's Content objective List 1 NET's Language objective

4. List 2 previous learning objectives. (What will the students need to know in order to complete this project)

5. List 4 objectives for SWBAT

6. Discuss how you plan to differentiate to accommodate for ELL or Special needs students.

7. Outline how you will present and use the e-portfolio project in the classroom.

8. Write a short description of your assessment plan for this project.

E-Portfolio tools

Websites



<https://education.weebly.com>



<https://www.wix.com>



<http://resources.pebblepad.co.uk/portfoliochecklistdownload>

Apps

Show Me



Interactive white board app

Seesaw



<https://web.seesaw.me>

III

PART 3

CHAPTER 9 INSTRUCTOR'S GUIDE

The instructor's guide contains several useful tools, discussion questions, a case study, review questions, additional chapter assignments, lesson examples and a student application assignment. As the Instructor, pick and choose which of these materials work for you or you may decide to use our ideas and create your own. This guide is intended to help solidify the information from the chapter and help you as an instructor implement the application of these materials.

Discussion Questions

The following questions are intended for use in a small group, discussion setting. Please use these questions to help the students understand the important concepts in this chapter. To add interest to class discussions, copy and paste some or all of these questions into a Nearpod <https://nearpod.com> or PowToon, <https://www.powtoon.com>, to create a fun, user friendly, student-voice based, review.

1. What is Professional development? Describe an effective professional development day.

1. Consider the National Education Technology Standards (NET's) found in the chapter or on the ISTE website, listed below. What types of professional development, pertaining to your specific endorsement, best fit these standards?

1. Do you think that all teachers should understand how to use newer technologies in their classrooms? Why or why not?

1. List and discuss the four characteristics of an effective professional development.

1. Have you attended any professional development events? If so, how did it help you to become a better future teacher?

1. How many hours of professional development do you need?

1. Are there professional development opportunities available to help you learn more about new technologies? If so what are they and how do you find them?

ISTE National Education Technology Standards (NET's)

Standards for students: <https://www.iste.org/standards/standards/for-students#startstandards>

Standards for teachers: https://www.iste.org/docs/pdfs/20-14_ISTE_Standards-T_PDF.pdf

Case: Lifelong Learning

As you read the following scenario, think about how you will continue to develop professionally in technology- supported learning.

The teachers at Pierce Junior High School had just participated in an in-service provided by the state education department. The focus of the meeting was the new state technology standards for students. The teachers learned that, in addition to content area standards and grade level indicators, the state was requiring all teachers to address the technology standards throughout the curriculum. During the workshop the presenter provided a resource list that included many print and electronic resources that teachers could use to help them learn about the technology standards and integrate them into instruction.

Patricia Morello, an eighth-grade English teacher, used technology regularly in her classes, particularly word processing. Her students typed their essays, looked for resources on the Web, and sometimes made graphic organizers to lay out the structure of a text. Patricia felt that she could probably meet the majority of the standards with little change. Just to make sure that she was working in the right direction, she decided to complete the Learning with Technology Profile Tool at <https://www.iste.org/standards/lead-transform/diagnostic-tool>. When she received her responses in graphical form, she discovered to her dismay that there was a lot more that she could do to use technology to engage learners. She also found that the technology she was using in her classes was neither very challenging nor very functional for students. Patricia understood why the standards should be addressed well and decided that she needed to learn more about the use of technology to meet standards, but she was unsure where to begin and how she could fit professional development in technology into her already- busy schedule.

Review Questions:

Answer these questions about the case. There are no right or wrong answers to this chapter preview—the goal is for you to respond before you read the chapter. Then, as you interact with the chapter contents, think about how your answers might change.

1. Where should Patricia start her professional development? Why?

2. How can new teachers fit professional development about technology into their busy professional lives?

3. Should all teachers know about technology and its uses? Why or why not?

4. How can teachers learn about technology use? List 3-5 ways.

Patricia understands the importance of helping students to meet standards, but she also is realistic about what she can do with the amount of time and current knowledge that she has. She, like many other teachers, is willing to learn more but has a number of barriers to overcome to be able to do so. The goal of this chapter is to help you to understand the role of professional development in learning to teach with technology and how some of these barriers might be bridged. Although you may not be thinking about professional development yet, you should be aware of the opportunities that exist so that you can plan appropriately when the time comes. After reading this chapter, you will be able to:

- Understand the role of professional development in technology-supported learning in student achievement and school change.
- Discuss guidelines for professional development in technology-supported learning.
- Evaluate tools for teacher development in technology-supported learning.
- Discover and participate in effective activities to support technical and pedagogical development.
- Assess your own development in technology-supported learning and teaching.

When you have completed this chapter, which NETS*T will you have addressed?

The sample activities and tools will help you understand the many opportunities available for professional development in technology. To begin, review the standards that guide teacher professional development in technology-supported learning in this chapter's Meeting the Standards.

- How can these standard is help Patricia and other teachers folks on what they need to do? Which of these standard is do you think you have mastered? What evidence do you have?

- What should the general goals for Patricia's PDB? Why?

- What can Patricia Morello do to make sure that her PD choices will be effective?

- What other benefits can you think of the teachers may derive from participating in PD? Who else benefits, and in what ways?

- At what stage in her development in technology-supported Learning is Patricia? What stage are you in? Describe why you think so.

- How can Patricia gain the support she needs from her colleagues, school, and district?

- Which of these tools might be most appropriate for Patricia to learn? Why do you think so?

- Which of these activities might be good for Patricia to start with? Why? Which is most interesting/useful for you? Why?

How do you evaluate your own learning? What criteria do you use? Are there others that you should consider? Why?

- How likely is Patricia to stick to have a plan? Why do you think so? How should the principal evaluate had a plan? Why?

- Which information in this chapter is most valuable to you? Why? How will you use it in your teaching?

PROFESSIONAL DEVELOPMENT PLAN EXAMPLE

Patricia decides to complete a formal learning plan, not only to guide her own learning but to share with her principal and others from whom she will ask support. Her plan, using the district form, is presented here.

TECHNOLOGY LEARNING PLAN

1. Write information about your strengths/weaknesses, knowledge and skills, and/or practical technology use. Include the source of the information. For example, you can read the following ISTE article that discusses technology tools that support the NET standards.
<https://www.iste.org/explore/articleDetail?articleid=777&category=ISTE-blog&article=>
1. Reflect on what your answer to Question 1 means for potential areas of improvement, questions to be answered, skills to be learned, and/or problems to be addressed.
1. Create several goal statements based on your answer to Question 2. Include your specific, obtainable learning goal, a measurable outcome, and how you expect to achieve it (an online course? a conference? a learning circle?). Prioritize the goals, and note when you expect to have achieved each one.

Goal 1: *Become more informed. I'll talk to colleagues, make time to search the Web, and join a teacher technology listserv discussion to find out what other teachers do in eighth-grade English with technology. I'll keep notes to guide my other goals. This will take all fall semester.*

Goal 2: *Collect resources. I'll make lists of 10 Web sites and software packages for each major theme in the eighth-grade English curriculum. I'll have students help so it won't take so long and I'll find sites that work and that they're interested in. They can test any software we find. We'll start working on this halfway through fall and continue until we're satisfied that we have a core list of excellent resources.*

Goal 3: *Learn one new technology. I'll ask the district to buy me a handheld computer with my resource funds that I can use while I work on Goals 1 and 2. I'll analyze this technology in light of what the goals for my classroom are. I should know this technology well by the end of the school year.*

1. How will you measure progress toward your goals?

For example: Keep a journal of my activities and of how I implement them in class. I'll also collect copies of the artifacts we produce, including Web site lists and activity ideas. I will present my new understandings at the last staff meeting of the year.

Patricia could have easily used the NETS*T standards, her state technology standards, and/or her school curriculum to guide her in developing her learning plan. Notice that in her plan Patricia is following many of the guidelines from this chapter—she is giving herself enough time to accomplish her goals within her busy schedule, is counting on her students and colleagues for help and collaboration, and has chosen goals that relate directly to the needs of her classroom and in which she is invested.

There is plenty more that can be said about professional development. There are more re- sources, more ideas for assessment of PD plans and experiences, more explanations for why PD is necessary and how it can best be done. However, the essential ideas have been included in this chapter. PD becomes even more important as both technologies and the focus of education change. These changes are the focus of chapter 10.

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CHAPTER EXTENSIONS

Adapt

Develop a personal technology learning plan. Use the Technology Learning Plan form found in chapter 1. As you answer the questions, think about your own individual interests in technology. List ways that work with your learning style that can help you to learn more about those things you are interested in. Decide how you can best assess your learning.

Technology Learning Plan

1. Write information about your strengths/weaknesses, knowledge and skills, and/or practical technology use. Include the source of the information.
1. Reflect on what your answer to Question 1 means for potential areas of improvement, questions to be answered, skills to be learned, and/or problems to be ad- dressed.

1. Create several goal statements based on your answer to Question 2. Include your specific, obtainable learning goal, a measurable outcome, and how you expect to achieve it (an online course? a conference? a learning circle?). Prioritize the goals, and note when you expect to have achieved each one.
1. How will you measure progress toward your goals?

Practice

1. *Start a technology resource list.* Develop a system to keep your important links and technology resources in some efficient manner. Start this resource list by going back through this book and picking out important resources.
1. *Test PD tools.* See if any of the PD tools mentioned in this chapter are interesting to you and/or work with your time and teaching style. Note which and why.
1. *Describe a tool that you use regularly.* Brainstorm how you might move it from personal use into more administrative or academic purposes.
1. *Apply the NETS*T.* Map the standards onto knowledge that you have gained while using this text, giving specific examples of how you have met these standards for teachers. Note gaps that you hope to fill.

Explore

1. Make a dissemination plan. Many of your colleagues will not have the same information, learning, and technology that you have. How will you share what you know with your colleagues? Outline a plan.
1. Find new resources. Look at technology magazines online or in the library and note which you would like to consult on a regular basis and why. Which do not seem as useful?
1. Interview a teacher. Choose a local teacher to interview. What does her school or district provide in the way of PD in technology-supported learning? What does she wish it would provide? What steps is she taking to make it happen? Summarize your findings.

Additional Student Application

The following assignment is intended to help individual students go beyond what they've read and apply the information from the chapter. After reading chapter 9 students will have a broad overview of specific websites and how to apply them as tools in the classroom. This application assignment will delve more deeply into designing a lesson and applying technology, more specifically, social media and its use in the classroom to develop a user-friendly professional development lesson.

Create your own professional development based on the use of school approved social media in the classroom.

1. Identify the social media you would use (Examples: Schoology, Edmodo, twitter etc.) Remember that it needs to be social media that will be allowed in the schools.
1. Write a brief description explaining the method you would use to teach your fellow teachers how to use this type of Social media effectively in the classroom.
1. Describe how you would protect the students in your school from the pitfalls of social media, cyber bullying, pornography, inappropriate language, etc.
 - What methods would you use to teach your students responsible computer and internet use?
1. Describe the types of technology you would use to teach your professional development.
 - Discuss how you would use the web, tablets, the classroom computers and projector to provide the information for your fellow teachers.
1. Discuss how you would assess whether your professional development lesson was successful or not.
 - Would you provide a formative or summative assessment at the end to see if your fellow teachers learned the intended information from your presentation?
 - If so how would you accomplish this? What assessment tools would you use?
1. Reflect on the professional development that you designed, how would it help the teachers in your

school or district?

Website and App Tools:



<https://create.kahoot.it/login>

YouTube Kahoot explanation <https://youtu.be/v2JbY979WUg>



<https://nearpod.com>



<https://www.socrative.com>