Educational **Technology** for Teachers

SAMPLE BOOK

The First Ever Multiplatform Interactive Digital Textbook on Educational Technology

DR. GREGORY M. FRANCOM

Educational Technology for Teachers

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DR. GREGORY M. FRANCOM

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Educational Technology for Teachers

DR. GREGORY M. FRANCOM

About the Author

Dr. Gregory M. Francom is a Professor of E-Learning at Northern State University in Aberdeen, South Dakota. He prepares pre-service teachers to successfully use educational technology for learning. Dr. Francom has researched and implemented project-based and constructionist learning experiences for K-12 and higher education students. He is the author of numerous articles and research studies in the area of educational technology.

Dr. Francom completed his doctorate degree in learning, design, and technology at the University of Georgia. He also holds a bachelor's degree in media arts studies from Brigham Young University and a master's degree in instructional technology from Utah State University. He can be contacted by email at greg.francom@gmail.com.

Methods and Concepts for the Use of Technology in Education

"New technology is common, new thinking is rare"

-Sir Peter Blake

CHAPTER OBJECTIVES

AFTER READING THIS CHAPTER, YOU WILL BE ABLE TO:

- Define educational technology and discuss the importance of educational technology in the Information Age
- Discuss the future of teaching and learning as it relates to Information Age trends
- Explain the major aspects of Information Age learning methods including constructivism and student-centered learning, constructionism, project-based learning and higher-order learning
- Explain the concepts of affordances, digital natives, web 2.0 and learning 2.0
- Choose to develop and implement an Information Age approach to educational technology in the classroom

ISTE STANDARDS FOR EDUCATORS IN THIS CHAPTER

1. LEARNER
a. Set professional learning goals to explore and apply pedagogical approaches made possible by technology and reflect on their effectiveness.
c. Stay current with research that supports improved student learning outcomes, including findings from the learning sciences.

2. LEADER
b. Advocate for equitable access to educational technology, digital content and learning opportunities to meet the diverse needs of all students.

4. COLLABORATOR
a. Dedicate planning time to collaborate with colleagues to create authentic learning experiences that leverage technology.

5. DESIGNER
a. Use technology to create, adapt and personalize learning experiences that foster independent learning and accommodate learner differences and needs.
b. Design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.
c. Explore and apply instructional design principles to create innovative digital learning environments that engage and support learning.

6. FACILITATOR
a. Foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.
b. Manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.
c. Create learning opportunities that challenge students to use a design process and computational thinking to innovate and solve problems.

7. ANALYST
a. Provide alternative ways for students to demonstrate competency and reflect on their learning using technology.

Education in the Information Age

One of the most important lessons that teachers can learn about educational technology is that in order to help students learn, technology must be used in appropriate ways. Simply using technology in the classroom does not guarantee student learning. Teachers must also take advantage of new learning methods and techniques that have become possible and necessary because of advances in technology and in our society.
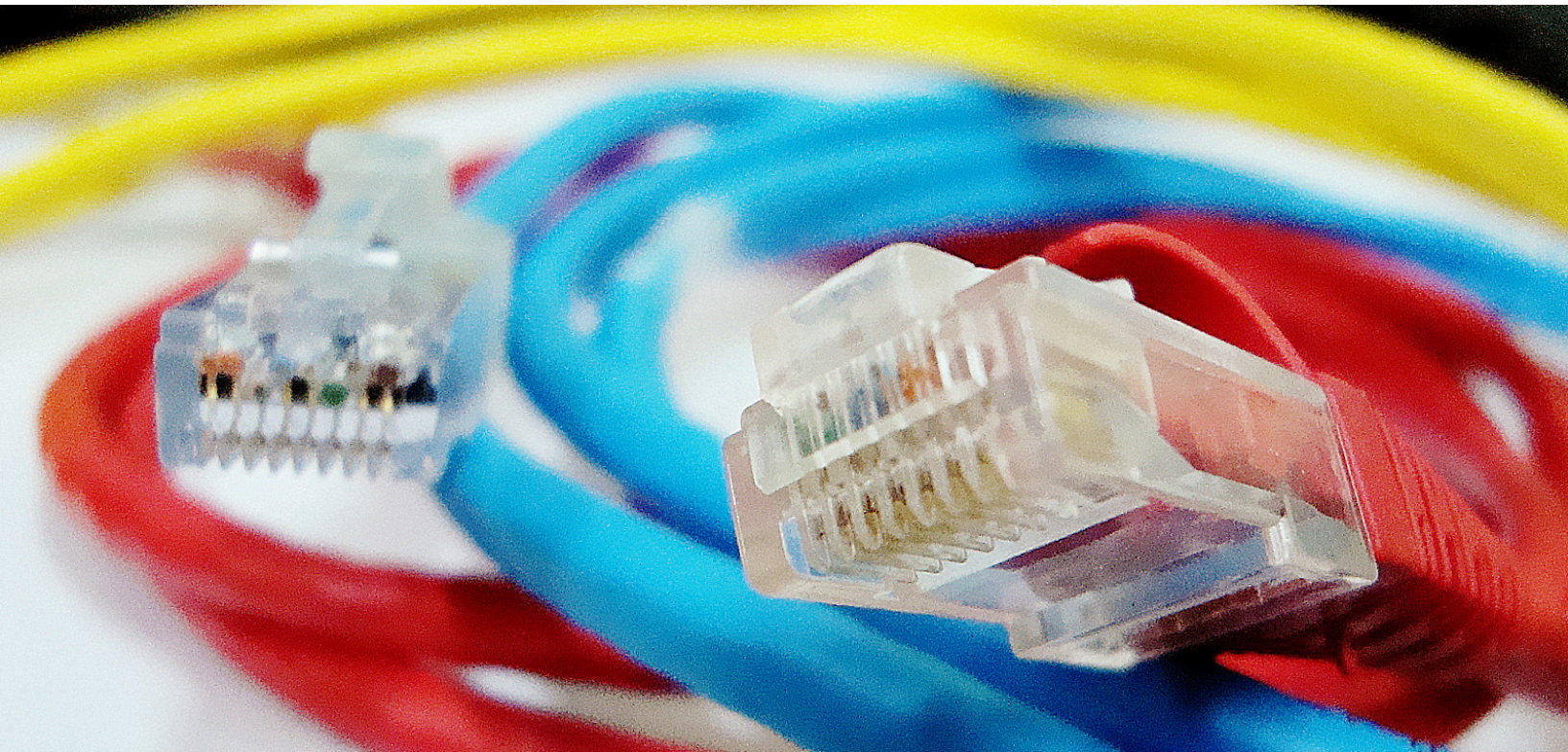
From the Socratic method of teaching in ancient times to the apprenticeship model during the middle ages, many different learning methods have been developed and used through the years to support student learning. Education has also been organized and structured in many different ways. Each of these learning methods and educational

structures has emerged from the needs and constraints of the time and society in which the method was used.

The American one-room schoolhouse is one example of an educational structure that matched the needs and constraints of its time in rural America (Reese, 2011; Zimmerman, 2009). During the first centuries of the European settlement of America, the majority of Americans lived in rural areas and had limited transportation options. The one-room schoolhouse provided a way for education to reach people in many different locations (Reese, 2011; Zimmerman, 2009). One-room schoolhouses were built and placed strategically so that students from a rural and geographically dispersed area could attend and learn. Students from the same geographical area often attended the same one-room schoolhouse even though they were in different grades and at different levels of learning (Reese, 2011). Each schoolhouse had a single teacher that would attempt to support the learning needs of a diverse group of students. To learn more about the one-room schoolhouse, click on the slideshow. The one-room schoolhouse eventually declined during the 20th century as a result of changes in American society such as industrialization and urbanization (Zimmerman, 2009). These changes led to an Industrial Age education system that valued conformity and centralized control.

Learn More

The American One-Room Schoolhouse

INFORMATION AGE EDUCATION

Educational practices and structures must adapt to the needs of society in the Information Age.

Changes continue to occur in our society and we have shifted from an industrial age that valued centralized control and conformity, to an Information Age that values personal initiative and diversity. The one-room schoolhouse and even the industrial educational system in which we currently operate remain behind with regard to learning methods and educational structures (Aslan & Reigeluth, 2013; Reigeluth & Garfinkle, 1994; Stoll & Giddings, 2012).

Just as the one-room schoolhouse was an adaptation to the needs of the society of its time, learning models and educational structures must now adapt to the needs of society in the Information Age (Aslan & Reigeluth, 2013). In the Information Age, the abundance of technological tools and learning resources should shift our teaching and learning activities to be generally more student centered (Aslan & Reigeluth, 2013; Duffy, 2009). Some student-centered learning methods are presented later in this chapter. Each method reflects the current needs and realities of the Information Age, so be sure to consider each as a possible way for you to improve teaching and learning in your classroom. Before we discuss the learning methods, let's talk about what changes will need to happen in the future of teaching and learning so that education will reflect the needs of our society in the Information Age.

Constructivism and Student-Centered Learning

Constructivism is a theory about how people learn that can help provide a framework for Information Age learning. Constructivist theory asserts that as students try to make sense of their experiences, they build their own knowledge in a structured format (Jonassen, Howland, Moore, & Marra, 2003; Mayer, 1999). The knowledge structures that students build can be individually constructed by the student or co-constructed as part of a social experience (Piaget, 1997; Vygotsky, 1980).

As mentioned previously, the abundance of technological tools and resources should shift our teaching and learning activities in schools to be generally more student-centered. So what is student-centered learning? Student-centered learning places the student at the center of the learning experience. The student plays an active role and may set his or her own learning goals and determine activities and resources that will help meet these goals (Stoll & Giddings, 2012). This type of learning is in contrast to a teacher-centered learning environment in which the teacher sets the goals, and has primary responsibility for determining the types of learning activities and resources that will help meet these goals. Student-centered learning approaches are compatible with constructivist theory, since learning in constructivism means building one's own knowledge. Click on the link below to find out more about how learning may happen according to constructivist theory.

Learn More

Constructivist Learning

We often think of the whole-class lecture, in which the teacher shares verbal and visual information, as the prototypical teacher-centered learning environment. In student-centered learning, a variety of approaches are possible, including student investigation, information seeking, project development, experimentation and independent study. There is increasing evidence that student-centered approaches to learning promote the development of critical problem solving and critical thinking skills more than teacher-centered approaches to learning (American Psychological Association, 1993).

Technological tools provide many key ways to support student-centered learning approaches because they allow students to investigate, experiment, seek information and do other student-centered activities more efficiently.

According to constructivist theory, knowledge cannot be easily transmitted from teacher to student, and the prototypical model of teacher-centered learning – the lecture – won't be very effective. Instead, students must build their own knowledge structures. The key to constructivism and student-centered learning is that students are involved in meaningful experiences, and they try to make sense of these experiences by reflecting upon and explaining them. Meaningful experiences can range from field trips, to scientific experiments, to problem investigations. In constructivist theory, students can also build knowledge as part of a social experience as they interact with fellow students, the teacher, or others who are more knowledgeable (Vygotsky, 1980).

21st Century Skills and ISTE NETS Standards

"Teaching in the Internet age means we must teach tomorrow's skills today."

-Jennifer Fleming

CHAPTER OBJECTIVES

AFTER READING THIS CHAPTER, YOU WILL BE ABLE TO:

- Describe the 21st century skills framework and the ISTE national educational technology standards
- Identify the core subjects and themes covered as part of the 21st century skills framework
- Explain the main types of skills within the learning and innovation area of the 21st century skills framework and the related ISTE national educational technology standards
- Explain the main types of skills within the information, media and technology area of the 21st century skills framework and the related ISTE national educational technology standards
- Explain the main types of skills within the life and career skills area of the 21st century skills framework and the related ISTE national educational technology standards
- Choose learning methods that meet ISTE national educational technology standards

Student-Centered Learning Technologies
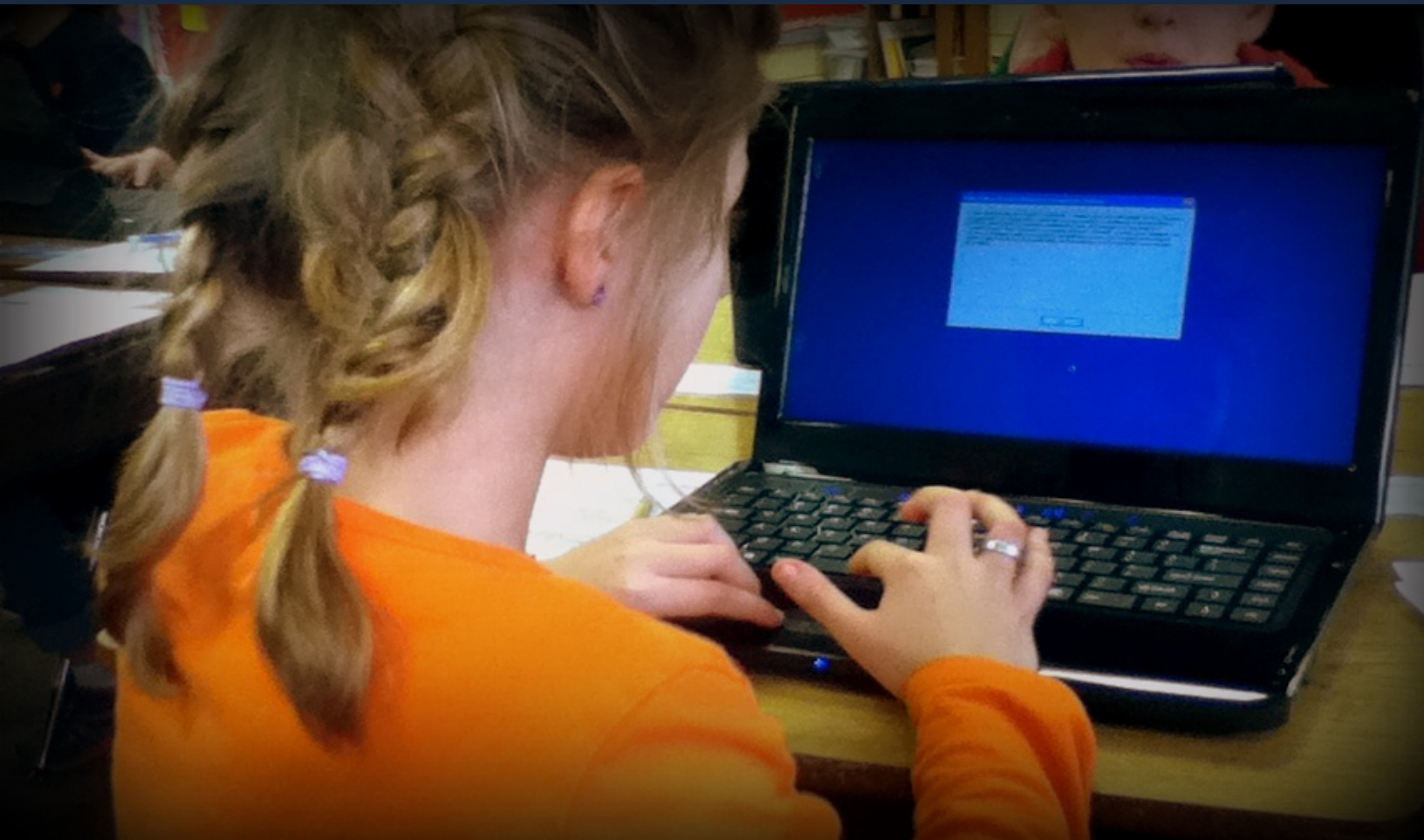
"We need technology in every classroom and in every student and teacher's hand, because it is the pen and paper of our time, and it is the lens through which we experience much of our world."

-David Warlick

CHAPTER OBJECTIVES

AFTER READING THIS CHAPTER, YOU WILL BE ABLE TO:

- Setup and use a wiki for student-centered learning
- Create and configure a class blog
- Use Google Drive applications to support student-centered learning
- Explain how different technologies can support location-based learning, including global positioning systems, augmented reality and mapping tools
- Create a quick response code to link to learning materials
- Create a personal or class website

ISTE STANDARDS FOR EDUCATORS IN THIS CHAPTER

1. LEARNER
a. Set professional learning goals to explore and apply pedagogical approaches made possible by technology and reflect on their effectiveness.

2. LEADER
b. Advocate for equitable access to educational technology, digital content and learning opportunities to meet the diverse needs of all students.
c. Model for colleagues the identification, exploration, evaluation, curation and adoption of new digital resources and tools for learning.

3. CITIZEN
b. Establish a learning culture that promotes curiosity and critical examination of online resources and fosters digital literacy and media fluency.

4. COLLABORATOR
a. Dedicate planning time to collaborate with colleagues to create authentic learning experiences that leverage technology.
b. Collaborate and co-learn with students to discover and use new digital resources and diagnose and troubleshoot technology issues.
c. Use collaborative tools to expand students' authentic, real-world learning experiences by engaging virtually with experts, teams and students, locally and globally.

5. DESIGNER
b. Design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.
c. Explore and apply instructional design principles to create innovative digital learning environments that engage and support learning.

6. FACILITATOR
a. Foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.
b. Manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.
d. Demonstrate cultural competency when communicating with students, parents and colleagues and interact with them as co-collaborators in student learning.

7. ANALYST
a. Provide alternative ways for students to demonstrate competency and reflect on their learning using technology.

Wikis

The first student-centered learning technology we will introduce is the wiki. Wikis have been around for a number of years, the first wiki was "WikiWikiWeb," which was developed and implemented by Ward Cunningham in 1995 (Leuf & Cunningham, 2001). Wikis are technologies that allow the editing of a single website, or group of pages, by multiple people (Ebersbach, Glaser, Heigl, & Warta, 2008; Leuf & Cunningham, 2001). They allow quick and easy page editing by a variety of people on a website that is publicly viewable. The word "wiki" is a Hawaiian word, which means "quick." Take a look at some examples of wikis that have been setup and used for learning activities by clicking on the following web links.

Web Link

"What Else" Class Wiki

Web Link

Señora Gruettner's Spanish Wiki

Most wikis can be configured to only allow certain users to edit pages in the wiki, but some wikis can also be configured to allow unregistered guests to edit pages. If you create a wiki, be sure to be careful with these settings as you don't want to have someone delete your content or fill your wiki with spam and advertisements. However, wikis do include features that allow you to easily revert to a previous version of the content and eliminate more recent changes if unauthorized changes to the wiki were to occur.

Although wikis have been around for a while, they are still popular as an educational tool. There are many different wiki programs that can be downloaded and installed on a web server for free. Some of these include mediawiki, dokuwiki and pmwiki.

However, installing, properly configuring and maintaining one of these wiki applications on a web server requires a high level of technology skills and expertise.

Most teachers choose to use a wiki service on a website where creating a wiki is as easy as signing up on the site. Probably the most popular website that offers wiki services for educators was Wikispaces, which shut down in 2018. An alternative to Wikispaces for setting up traditional educational wikis is pbworks which offers educational pricing and a limited free wiki service. Also, Google Documents is a free tool that allows for easy collaboration between students. We'll discuss Google Documents later in this chapter.
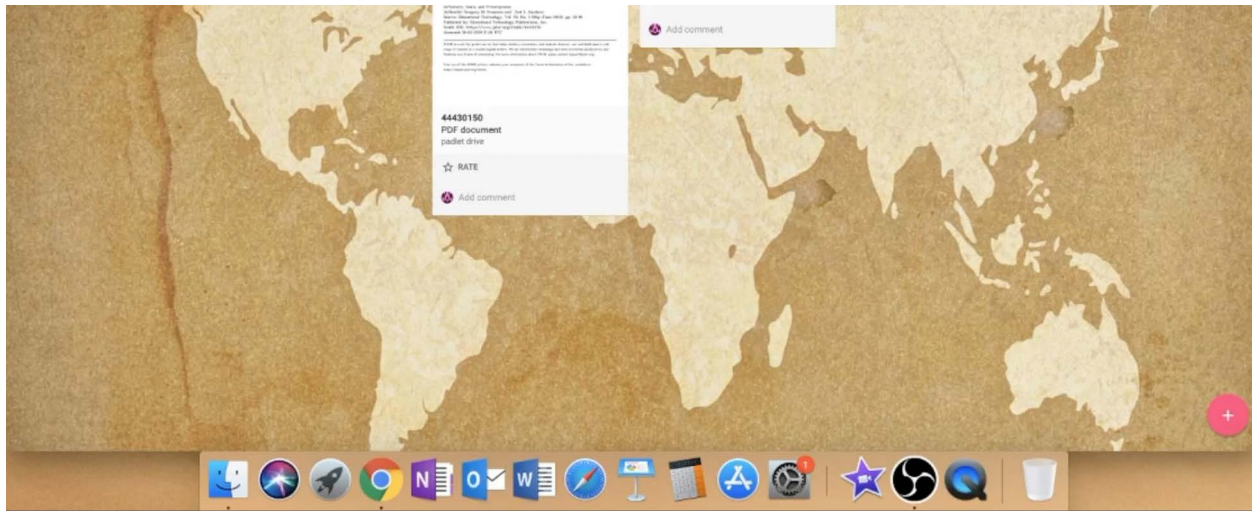
New wiki tools

Because opportunities for online collaboration are changing to become more media rich, many teachers are embracing wiki-like tools that allow students to post media responses and presentations in a single location. Padlet and Flipgrid are two such tools that make it easy for multiple students to post media to one place. With Padlet, a teacher can easily create a space to which students can post text, files, pictures, videos and more. Using Flipgrid, a teacher can create a single place to which students can post multiple video responses. Click on the following links and view the lessons to learn more about Padlet and Flipgrid.
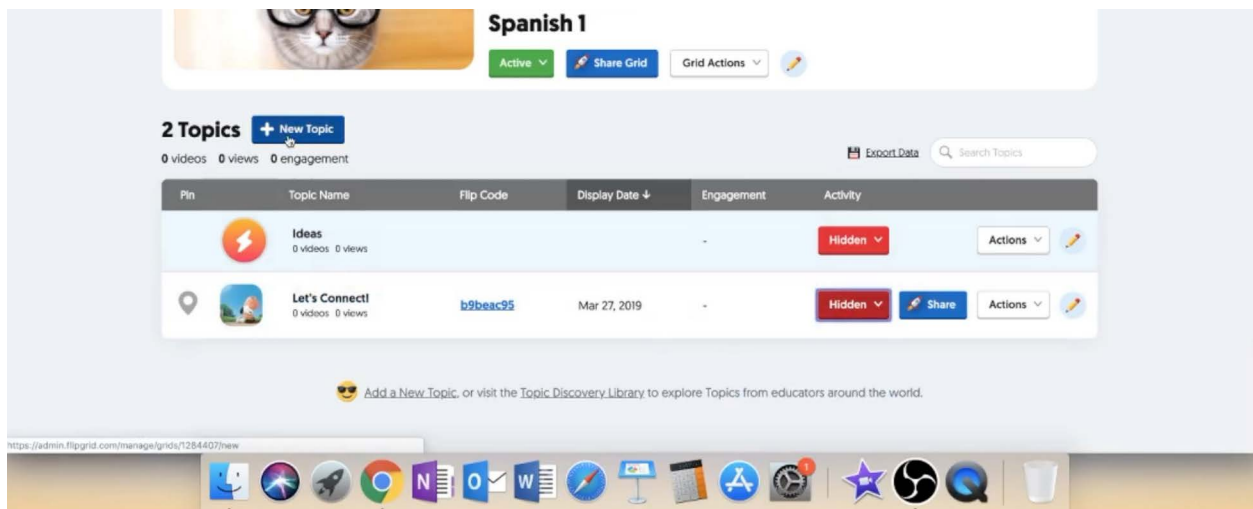
Web Link

Padlet Website

Watch
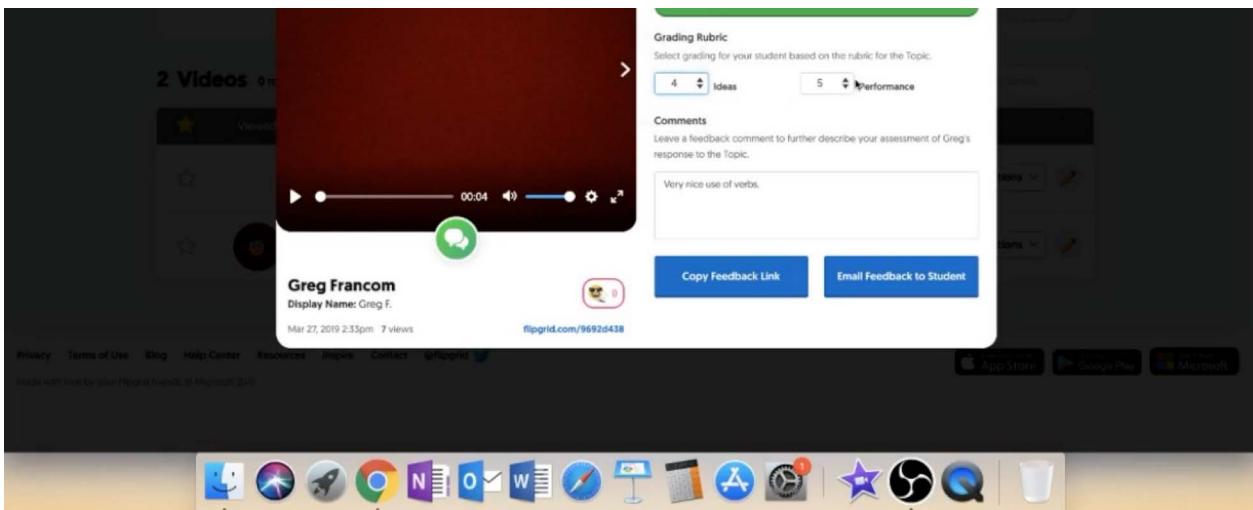
Using Padlet

Web Link

Flipgrid Website

Watch

Setting up Flipgrid

Watch

Student Responses on Flipgrid

Using a wiki for student-centered learning

Wikis are powerful tools for learning because they can be configured to allow students to collaboratively post content. Teachers can design projects and activities in which students post text, pictures and even videos on a designated subject to a single location. A particularly powerful form of learning using wikis is "jigsaw learning" in which each group of students in a classroom may learn about a different aspect of the same subject. The groups of students can post what they have learned onto a wiki page and when each group is done, the result is a full wiki with several different pages covering all of the different aspects of the subject.

USING A WIKI IN EDUCATION – SOCIAL STUDIES

In a social studies unit on pioneers, a teacher could assign groups of students to learn about aspects of pioneer life including transportation, shelter, food, traditions, the Homestead Act, and more. The teacher could have a wiki setup with pages for each of these aspects of pioneer life. Then each group of students could post what they learned on their wiki page. When each group has posted their information, the result would be a full site featuring pages on the aspects of pioneer life. Each student can then learn from what other students posted on the wiki.

Other wiki tools

Here are a few other useful wiki-like websites and apps that allow various users to add and edit words and pictures in a collaborative space. Pinterest allows users to "pin" a picture (with a link to the website where the picture came from) to a collaborative board. This social media site has allowed users to easily share quality ideas and links with each other. Seesaw is an iPad application that allows students to easily create text, graphics and other media and submit to the teacher or post to a class journal. This app makes it easy to organize and share student work.
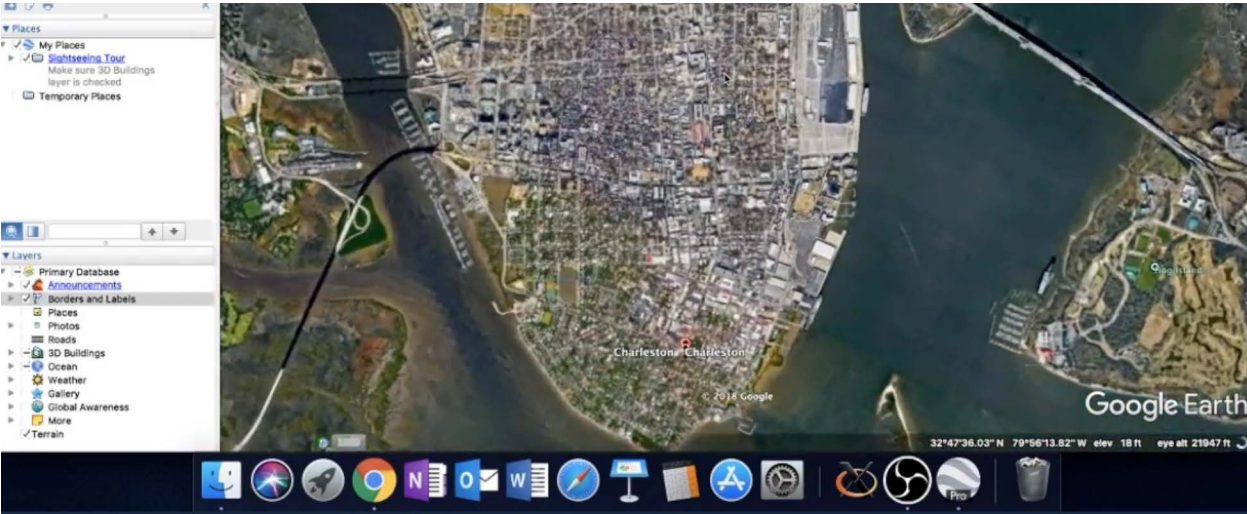
Mapping Tools

Perhaps the most common Information Age location-based learning experiences use one of a set of available online maps. From Google Maps to Yahoo Maps to Bing Maps, a variety of sites are available to use to navigate around the world and find more information about locations. These online maps can be used in education to provide students with enhanced visuals of locations for learning purposes. Google Earth is an excellent free mapping tool that can be used for location-based learning experiences.

Google Earth uses the same technology as Google Maps, but adds many features to what is available on Google Maps for free. Follow the web link below to access the Google Earth website and watch the lesson which shows you how to use Google Earth.

Teachers have taken advantage of the affordances of Google Earth to support learning in many different ways. Perhaps the simplest use of Google Earth in the classroom involves showing key locations featured in subject matter content to students on an interactive whiteboard. However, here are some more sophisticated ideas for using Google Earth in education.

IDEAS FOR USING GOOGLE EARTH IN EDUCATION

- Have students follow the locations of an historical event using Google Earth and make note of the geography, terrain and other features from each location.
- Explore the main location of a literary work by viewing the location and making note of the setting, culture and geography for the work.
- Follow the journey of the characters in a literary work with students by showing journey locations, noting distances and making other observations that relate to the story.
- Learn more about the culture and language in a foreign country by zooming in on a part of that country and also going to street view to see pictures of people, buildings and signs.

An additional student-centered idea for teaching mathematics is to have students measure objects and distances using the Google Earth ruler and then calculate volume, circumference or use other mathematical formulas. Several interesting objects in Google Earth can be used including:

- A cylindrical building in Singapore (circumference, diameter, radius)
- The triangular Flatiron building in New York (angles, lengths and hypotenuse)
- The pyramids at Giza (volume, length and width)

Using the link below, take a look at the Google Maps Education website for more ideas for using Google Earth and Google Maps in education.

Web Link

Google Maps Education Website

Project-Based Learning with Technology

"Teachers need to stop saying, 'hand it in,' and start saying, 'publish it,' instead."

-Alan November

CHAPTER OBJECTIVES

AFTER READING THIS CHAPTER, YOU WILL BE ABLE TO:

- Discuss the essential elements of project-based learning
- Select appropriate technological tools and applications for a project
- Create a plan for project-based learning in your classroom
- Teach and model quality presentation skills, including planning, presence, visual design and voice
- Create a recorded online presentation for students to watch
- Teach and model quality video production and editing techniques
- Explain copyright and fair use as they relate to project-based learning and classroom activities
- Describe the role that open digital media resources and open-source software can play in project-based learning

ISTE STANDARDS FOR EDUCATORS IN THIS CHAPTER

1. LEARNER
a. Set professional learning goals to explore and apply pedagogical approaches made possible by technology and reflect on their effectiveness.

3. CITIZEN
b. Establish a learning culture that promotes curiosity and critical examination of online resources and fosters digital literacy and media fluency.
c. Mentor students in the safe, legal and ethical practices with digital tools and the protection of intellectual rights and property.
d. Model and promote management of personal data and digital identity and protect student data privacy.

4. COLLABORATOR
a. Dedicate planning time to collaborate with colleagues to create authentic learning experiences that leverage technology.
c. Use collaborative tools to expand students' authentic, real-world learning experiences by engaging virtually with experts, teams and students, locally and globally.

5. DESIGNER
a. Use technology to create, adapt and personalize learning experiences that foster independent learning and accommodate learner differences and needs.
b. Design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.
c. Explore and apply instructional design principles to create innovative digital learning environments that engage and support learning.

6. FACILITATOR
a. Foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.
b. Manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.
c. Create learning opportunities that challenge students to use a design process and computational thinking to innovate and solve problems.
d. Model and nurture creativity and creative expression to communicate ideas, knowledge or connections.

ISTE STANDARDS FOR EDUCATORS IN THIS CHAPTER

7. ANALYST

a. Provide alternative ways for students to demonstrate competency and reflect on their learning using technology.

b. Use technology to design and implement a variety of formative and summative assessments that accommodate learner needs, provide timely feedback to students and inform instruction.

c. Use assessment data to guide progress and communicate with students, parents and education stakeholders to build student self-direction.

Resource-Based Learning with Technology

"Teachers need to integrate technology seamlessly into the curriculum instead of viewing it as an add-on, an afterthought, or an event."

-Heidi Hayes Jacobs

CHAPTER OBJECTIVES

AFTER READING THIS CHAPTER, YOU WILL BE ABLE TO:

- Describe the importance of resource-based learning in the Information Age
- Find, evaluate and select appropriate learning resources for student learning
- Create quality resource-based learning activities for students
- Model and teach key practices for determining the accuracy of an information source
- State the steps students follow as they complete an information seeking activity
- Explain the children's internet protection act and its effect on schools
- Develop and implement quality student information seeking activities

ISTE STANDARDS FOR EDUCATORS IN THIS CHAPTER

1. LEARNER
b. Pursue professional interests by creating and actively participating in local and global learning networks.

2. LEADER
b. Advocate for equitable access to educational technology, digital content and learning opportunities to meet the diverse needs of all students.
c. Model for colleagues the identification, exploration, evaluation, curation and adoption of new digital resources and tools for learning.

3. CITIZEN
b. Establish a learning culture that promotes curiosity and critical examination of online resources and fosters digital literacy and media fluency.

4. COLLABORATOR
b. Collaborate and co-learn with students to discover and use new digital resources and diagnose and troubleshoot technology issues.
d. Demonstrate cultural competency when communicating with students, parents and colleagues and interact with them as co-collaborators in student learning.

5. DESIGNER
a. Use technology to create, adapt and personalize learning experiences that foster independent learning and accommodate learner differences and needs.
b. Design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.
c. Explore and apply instructional design principles to create innovative digital learning environments that engage and support learning.

ISTE STANDARDS FOR EDUCATORS IN THIS CHAPTER

6. FACILITATOR

a. Foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.

b. Manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.

Interactive Whiteboards for Higher-Order Learning
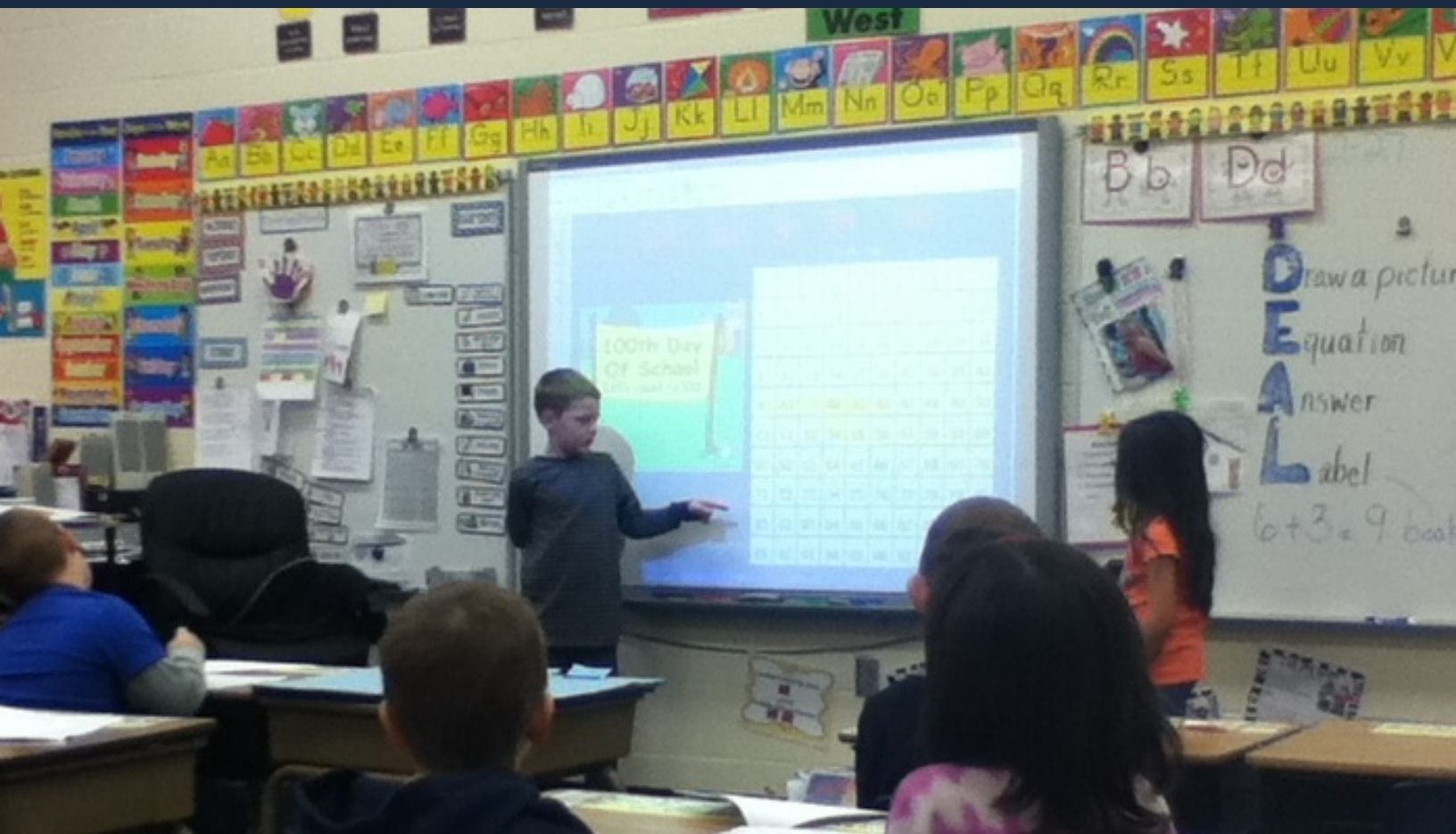
"Good teachers understand that while interactive whiteboards may be helpful and interesting, at the heart of it all is good-quality teaching."

-Chris Betcher and Mal Lee

CHAPTER OBJECTIVES

AFTER READING THIS CHAPTER, YOU WILL BE ABLE TO:

- Describe components of interactive whiteboard systems
- Use interactive whiteboard tools
- Troubleshoot an interactive whiteboard that is not functioning properly
- Select and use an interactive whiteboard software application to create an engaging presentation
- Support active, student-centered learning with an interactive whiteboard
- Create interactive whiteboard presentations and activities that support higher-order learning

ISTE STANDARDS FOR EDUCATORS IN THIS CHAPTER

2. LEADER
b. Advocate for equitable access to educational technology, digital content and learning opportunities to meet the diverse needs of all students.
c. Model for colleagues the identification, exploration, evaluation, curation and adoption of new digital resources and tools for learning.

4. COLLABORATOR
b. Collaborate and co-learn with students to discover and use new digital resources and diagnose and troubleshoot technology issues.

5. DESIGNER
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b. Design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.
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b. Model and nurture creativity and creative expression to communicate ideas, knowledge or connections.

7. ANALYST
a. Provide alternative ways for students to demonstrate competency and reflect on their learning using technology.
b. Use technology to design and implement a variety of formative and summative assessments that accommodate learner needs, provide timely feedback to students and inform instruction.
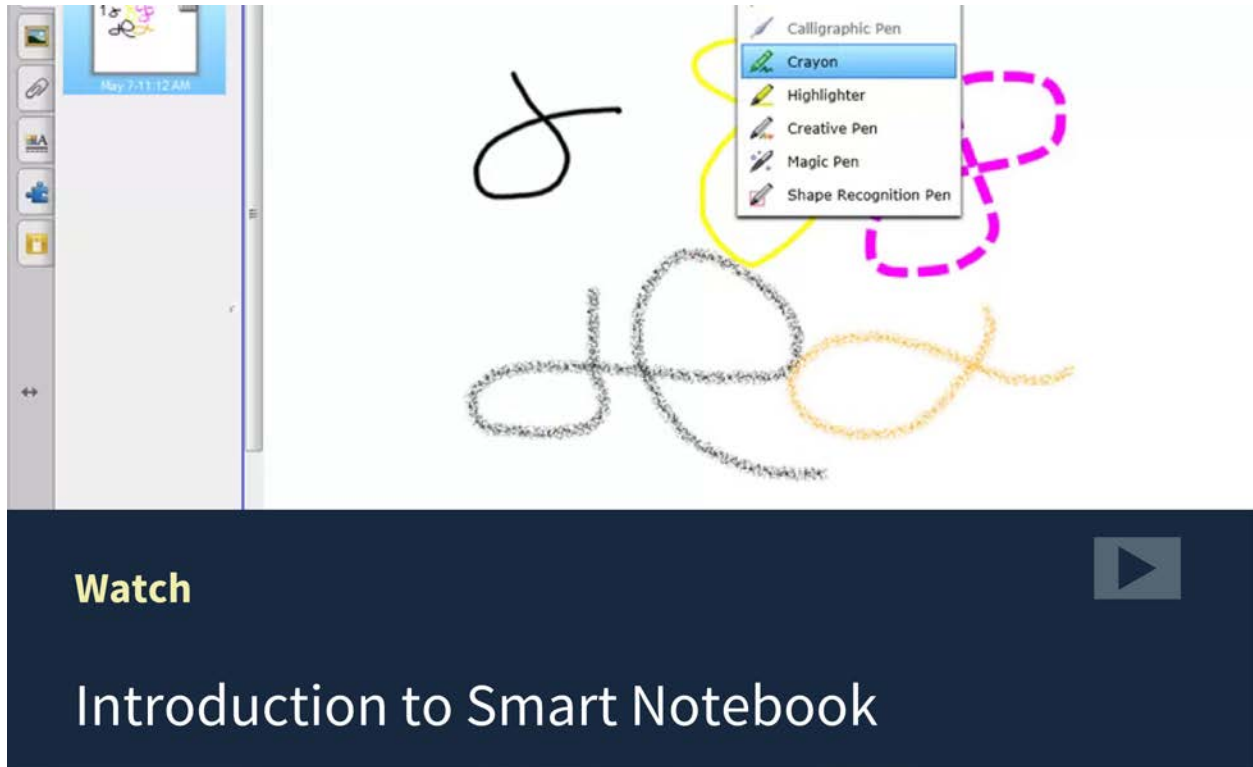
Smart Notebook
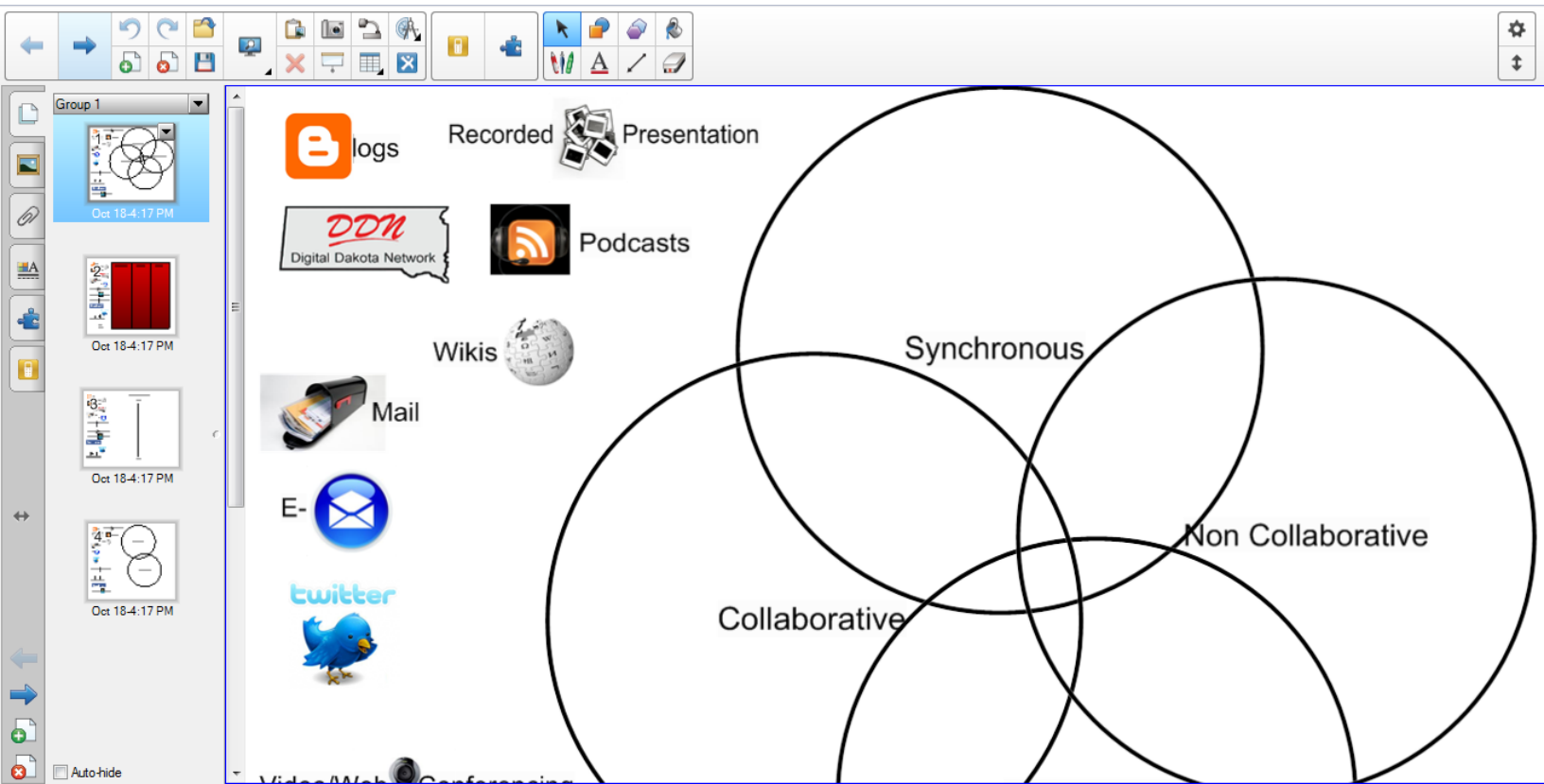
Smart Notebook is a software application provided for those teachers who have a Smart brand interactive whiteboard in the classroom. Smart Notebook is the most popular interactive whiteboard software application, simply because Smart interactive whiteboards hold the largest worldwide market share (PRWeb, 2012; Quillen, 2012). This software can be downloaded for free from the Smart Downloads Website at the link below.
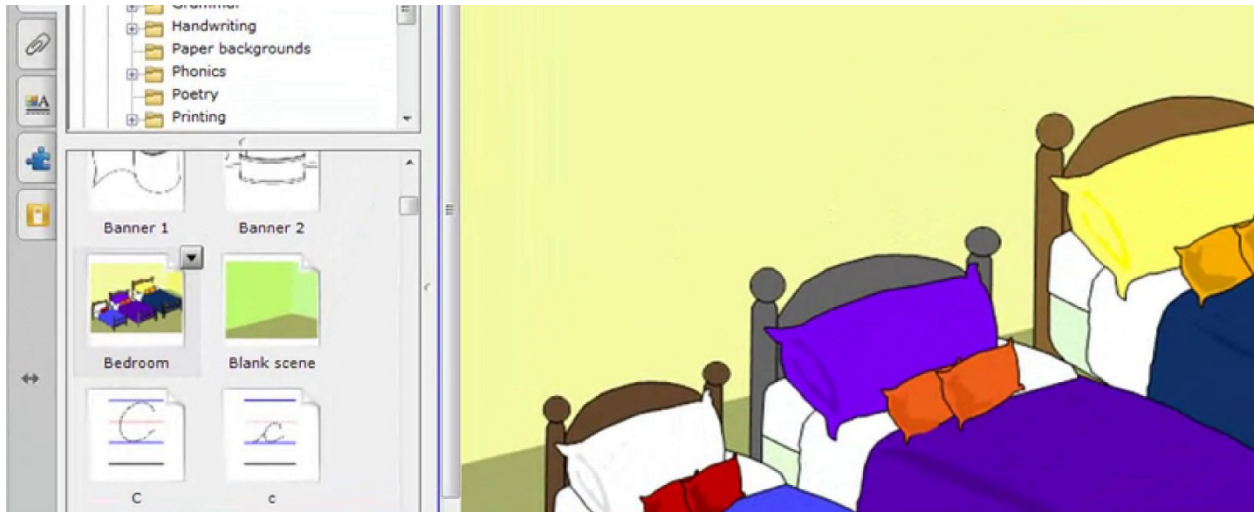
Web Link

Smart Downloads Website

Of course you don't have to use Smart Notebook software for every educational activity on a Smart brand interactive whiteboard, since there are many other ways to present information. However, Smart Notebook software does add interactive elements that are not available in other presentation software applications. For example, there are a variety of image, drag and drop, multiple choice and audio resources that come with Smart Notebook software. Watch the following lessons to learn more about how to use Smart Notebook.

Watch

Pictures and Media in Smart Notebook
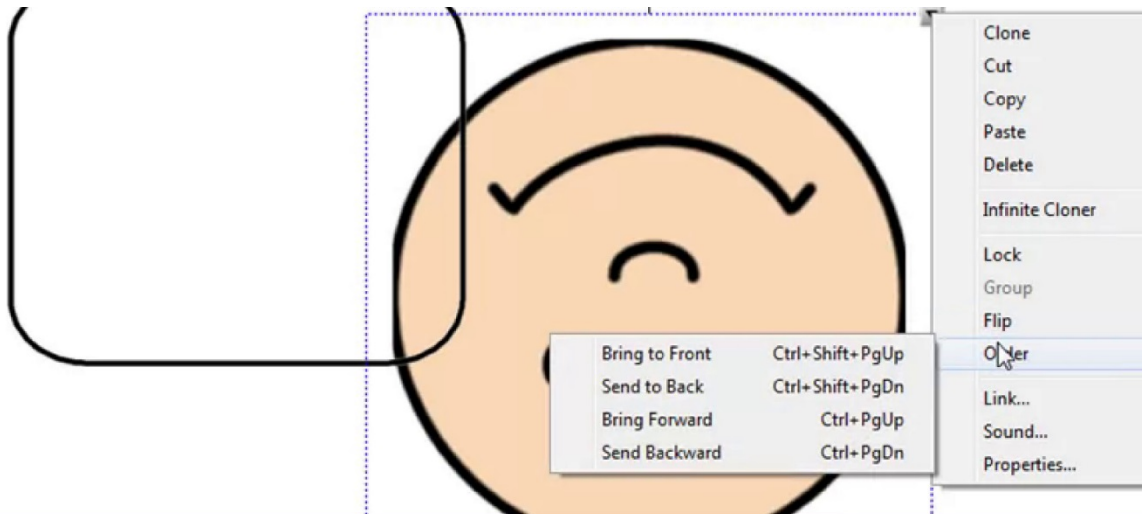
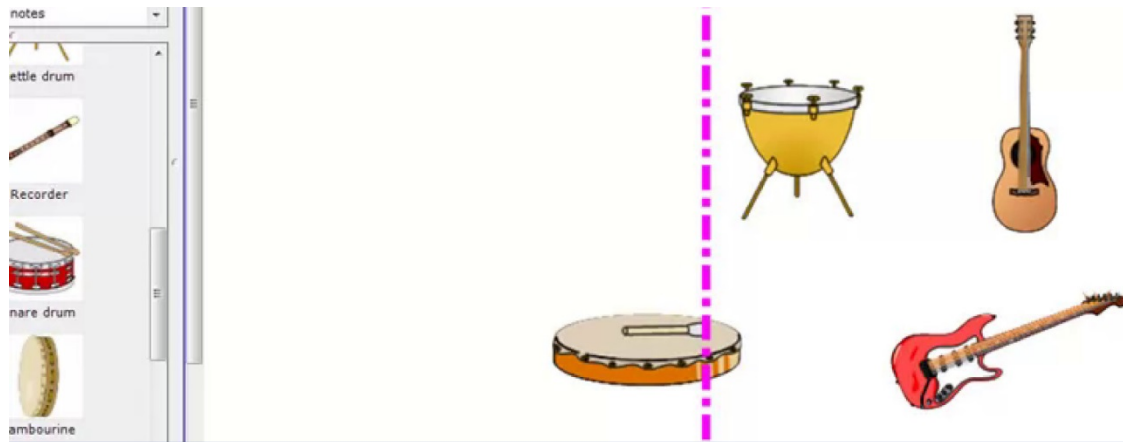

Watch

The Smart Notebook Context Menu

Recording and Object Animations in Smart Notebook

Teachers can find and download pre-made Smart Notebook files for free at the Smart Exchange website. On this website there are many different types of Smart Notebook files including lessons and games that can be adapted for use in teaching and learning. An internet search will also point you toward other Smart Notebook file exchange sites such as the Teachers Love Smartboards website. There are also new Smart Lab activities that allow students to complete activities on a personal device while one student is in the front of the classroom at the interactive whiteboard. Watch the following lessons that show how to create a more sophisticated drag and drop activity in Smart Notebook and also how to create Smart Lab activities that students can complete on their own classroom laptop or tablet computer.

Creating Drag and Drop Activities in Smart Notebook

Creating Smart Lab Activities

CHAPTER SEVEN

Distance Learning

"We need to bring learning to people instead of people to learning."

-Eliot Masie

CHAPTER OBJECTIVES

AFTER READING THIS CHAPTER, YOU WILL BE ABLE TO:

- Explain key concepts related to distance learning
- Discuss the major reasons that educational institutions provide distance learning
- Plan distance learning activities that follow effective practices for student learning
- Identify and learn to use distance learning tools for synchronous distance learning
- Conduct an effective synchronous distance learning session

ISTE STANDARDS FOR EDUCATORS IN THIS CHAPTER

1. LEARNER
a. Set professional learning goals to explore and apply pedagogical approaches made possible by technology and reflect on their effectiveness.
c. Stay current with research that supports improved student learning outcomes, including findings from the learning sciences.

2. LEADER
a. Shape, advance and accelerate a shared vision for empowered learning with technology by engaging with education stakeholders.

3. CITIZEN
a. Create experiences for learners to make positive, socially responsible contributions and exhibit empathetic behavior online that build relationships and community.

4. COLLABORATOR
c. Use collaborative tools to expand students' authentic, real-world learning experiences by engaging virtually with experts, teams and students, locally and globally.

5. DESIGNER
a. Use technology to create, adapt and personalize learning experiences that foster independent learning and accommodate learner differences and needs.
b. Design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.
c. Explore and apply instructional design principles to create innovative digital learning environments that engage and support learning.

6. FACILITATOR
a. Foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.
b. Manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.

ISTE STANDARDS FOR EDUCATORS IN THIS CHAPTER

7. ANALYST

a. Provide alternative ways for students to demonstrate competency and reflect on their learning using technology.

b. Use technology to design and implement a variety of formative and summative assessments that accommodate learner needs, provide timely feedback to students and inform instruction.

c. Use assessment data to guide progress and communicate with students, parents and education stakeholders to build student self-direction.