Educator Professional Development Handbook

Web-Enhanced Learning Environment Strategies Handbook, Reflection Tool, and Lesson Planner

2008

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**Original WELES Reflection Tool
developed in a joint effort between**

The Pennsylvania State University - College of Education
and NASA Dryden Flight Research Center Education Office

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Acknowledgements

The original concept of Web-Enhanced Learning Environment Strategies (WELES) was created based on research led by Dr. Barbara Grabowski and assisted by Tiffany A. Koszalka, Ph.D., at The Pennsylvania State University. The research and development was funded through a grant from NASA Dryden Flight Research Center (DFRC). The contributing partner at NASA DFRC was Dr. Marianne McCarthy.
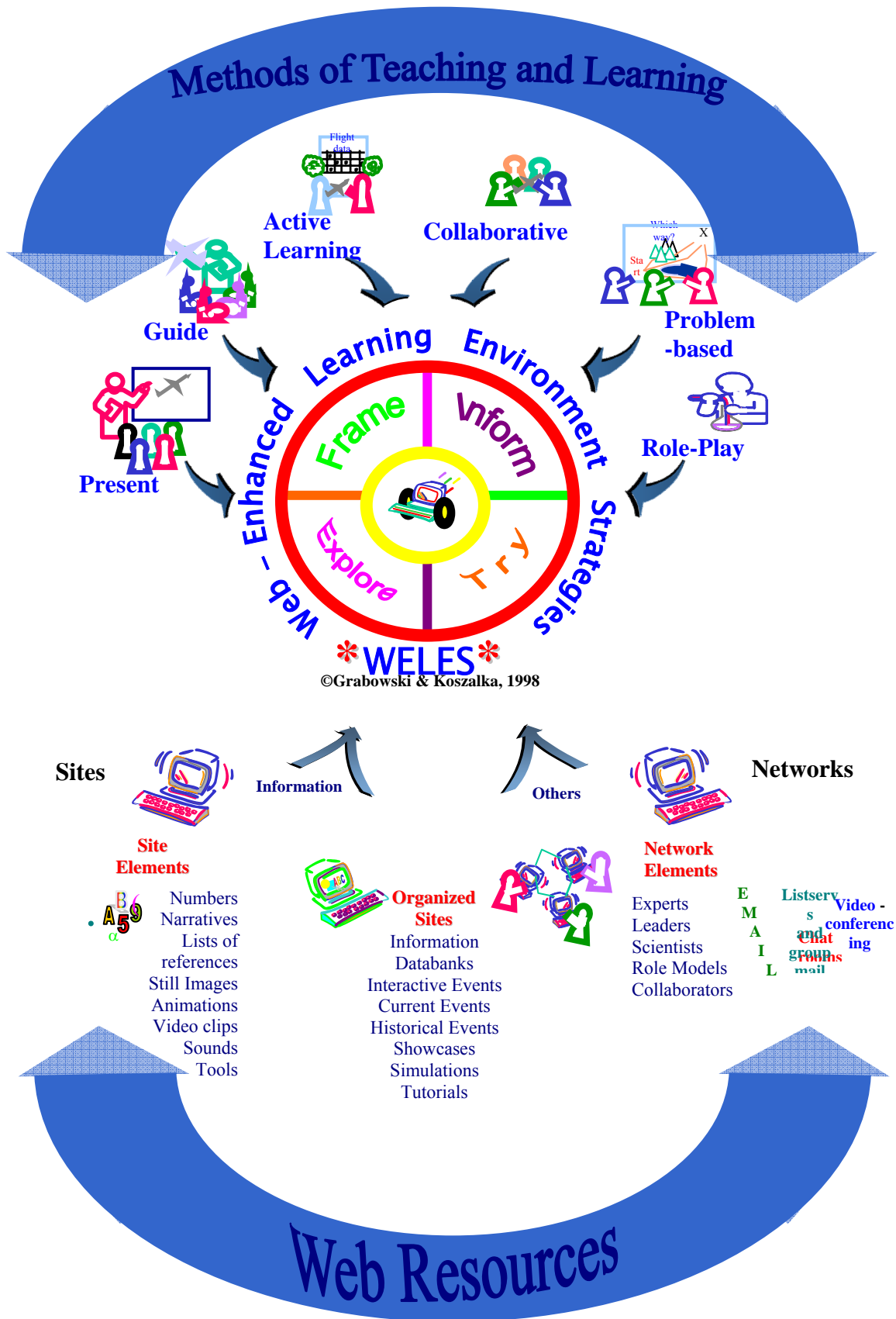
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WELES Reflection Tool

The Web-Enhancement Reflection Tool as represented by the diagram on the left is designed to help you strategize on how to use the web to enhance your classroom instruction. The reflection tool shows how the components of the WWW and six current methods of teaching can be merged into four Web-Enhanced Learning Environment Strategies (WELES). These strategies illustrate how you can enhance your *current* teaching practices using web, rather than traditional, resources. Each component of the tool is explained below.

Methods of Teaching – the "how"

The top portion of the reflection tool lists the methods of teaching that teachers currently use. These commonly used methods include **Present**, **Guide**, **Active Learning**, C**ollaborative** and **Problem-based Learning, and Role-Play**. Each method draws from the teaching and learning foundations of Expository and Inquisitory presentation, Generative learning, Collaborative learning, Problem-based learning, and Anchored instruction.

Web Resources – the "what"

The lower portion of the reflection tool outlines two major web resources--information links through **sites** and human resource (other people) links through **networks**.

The sites and networks are both composed of several elements appropriate for enhancing lesson activities. *Site Elements* are the raw material from which lessons can be created. These web resources can be used to present information in a lesson. *Network Elements* are those capabilities of the web that facilitate communication. In other words, these are the types of resources that connect people electronically to enable shared interactions.

Most sites are a combination of site and network elements. These *Organized Sites* are resources developed with a specific purpose in mind, such as to provide entertainment, present current events, share stories, provide instruction, or encourage hands-on activities. These sites connect students to both information and other people.

Web-Enhanced Learning Environment Strategies (WELES)

The center of the reflection tool outlines strategies that combine "how" teachers teach and "what" resources teachers use. The central Web-Enhanced Learning Environment Strategies help teachers reflect on how to "use the web" purposefully and intentionally to access information and human resources in a manner that is conducive to learning. Therefore, the WELES illustrate a union between methods of teaching and web resources. The booklet provides you with ideas on how to enhance the strategies you use everyday in your classrooms, namely to **FRAME** learning activities within current and meaningful realities, **INFORM** students about lesson content, provide opportunities for students to **EXPLORE** information and knowledge, and arrange occasions to **TRY** out new knowledge.

It is important to reemphasize that each of the Web-Enhanced Learning Environment Strategies *enhances* what you already do in your classroom. The enhancement comes from those Web resources you add to your preferred method of teaching.

More on Web-Enhanced Learning Environment Strategies (WELES)

Each of the merged lesson strategies (WELES) is described below.

Frame is a lesson strategy in which a context for studying a particular topic is established. Setting context for learning may include providing directions or creating a mood. Framing often occurs in the introductory and motivational activities to promote interest in subject areas or provide a context for approaching learning. Problems are often set in real or fantasy events that are easily accessible from the web. Framing is an important motivational strategy for all six methods of teaching, regardless of whether the teacher, the learner, or their partnership controls the lesson. Web resources take students to new settings, provide multiple views on specific events or issues, or expose students to curious situations that can frame all learning events.

Inform is the lesson strategy in which information about the content is conveyed to the learner during a presentation, demonstration, or discussion--that is--those activities that are representative of the present and guide teaching methods. Informing implies a directive role taken by the teacher or information. The Web is rich with site elements, organized sites and people from the network elements that can be used to provide this content.

Explore is the lesson strategy that is student directed. Students investigate, manipulate, and research subject areas, problems and situations, those activities represented in the guide, active learning, collaboration, problem based and role-playing teaching methods. Again, the Web is rich with information from site elements and organized sites that form the basis for this exploration. The Web is also rich with people through network elements and organized sites to function as exploration partners.

Try is the lesson strategy in which the student practices, or tests their newly acquired knowledge, skills or inclinations as represented in the guide, active learning, problem-based, and role playing methods of teaching. Teachers must be more selective of the type of sites that are selected to enable students to try out new learning. Sites in this case must be interactive in some way, either through interactive networked individuals or interactive sites. Students need to take an active role with the Web resources.

Methods of Teaching

Present

Why does the Present method enhance learning?

In essence, effective learning requires providing content (facts, concepts, procedures, and principles) and performance (remembering, using, creating) using four primary presentation forms: rules, examples, recall, and practice. Instruction is more effective when it includes presentation of the appropriate knowledge form, opportunity for practice, and learner guidance. Thus, a complete lesson consisting of an objective followed by some combination of presenting rules and examples and providing practice and feedback, appropriate to the learning task is an effective Presentation method. See the following web site for more explanation of presentation methods: http://www.gwu.edu/~tip/merrill.html

How can the World Wide Web support . . . Present?

- *Site elements* can be used to show students specific World Wide Web sites that support subject area, including pictures, diagrams, animations, video clips, or audio clips.

- Students can be sent to specific (predetermined) *site elements* and *organized sites* to research subject matter.

- *Network elements* can be used to bring guest speakers in to explain a specific topic.

Attributes of Present:

While using the Present method of teaching the teacher provides students with:

- rules and examples that illustrate the rules associated with the subject area.

- examples to illustrate pictorial relationships, application of the rules, context through historical information, and prerequisite information or to give contextual elaboration and to help students see the subject matter from many different perspectives.

Lesson Plan Reflection Questions

Learning outcomes: What will the students be expected to learn?

Lesson description: How will presentation strategies facilitate the learning outcomes?

Web resources: What types of web resources will support the learning strategy and learning outcomes?

Types of Web Resources well suited for Present

Site Elements: numbers, narratives, images, animations, video clips, audio clips

Organized Sites: information, current events, historical events, showcases

Network Elements: audio- and video-conferencing

Guide

Why does the Guide method enhance learning?

Changing the combination and order of presentation forms accounts for the effectiveness of question-driven instruction. A complete lesson would consist of an objective followed by some combination of asking about rules and examples and providing practice and feedback, appropriate to the learning task. See the following web site for more explanation of guide methods:
http://www.gwu.edu/~tip/merrill.html

Discovery Learning advocates a similar approach, tasking the student to figure out the meaning of what is to be learned. The student must add up observations and inferences, make comparisons, and interpret data to create a new insight they have not known before. See this web site to learn more: http://www.hood-consulting.com/amazing/discovery/discovery.html

How can the World Wide Web support . . . Guide?

- Students can search for *site elements* and *organized sites* that define rules or concepts of a subject area, including graphics, text elaboration, simulations, and video clips.

- Students find *site elements* that are supporting examples of rules generated.

- *Network elements* can be used to extend questioning strategies to experts outside the classroom.

Attributes of Guide:

A Guide method is:

Guide

- conversational where the students are required to discover the rules and concepts of a subject.

- student-driven in that students are tasked with discovering the concepts of the subject on the basis of practice examples.

- feedback-driven, where feedback and elaboration are provided during inquiry providing pictorial relationships, application of rules, context, and prerequisite information.

Lesson Plan Reflection Questions

Learning outcomes: What will the students be expected to discover?

Lesson description: How will questioning facilitate the learning outcomes?

Web resources: What types of web resources will support the learning strategy and learning outcomes?

Types of Web Resources well suited for Guide

Site Elements: numbers, narratives, images, animations, video clips

Organized Sites: information, current events, historical events, showcases

Network Elements: e-mail, chat rooms, newsgroups, audio- and video-conferencing

Active Learning

Why does Active Learning enhance learning?

Active learning theories assume the learner is not a passive receiver of information, rather is an active participant, working to construct meaningful understanding of information found in the environment. Comprehension occurs by formulating connections between perceived information, prior knowledge and other memory components. This participation actively engages students in interactions with subject matter. Students build deeper knowledge by physically and mentally manipulating models and information while actively seeking to organize and integrate informational relationships between what is seen, heard, felt, read, and mentally processed.

How can the World Wide Web support . . . Active Learning?

Site elements provide students with images, animated models, demonstrations, or applications that enable them to draw relationships between new concepts and prerequisite information.

Site elements can function to trigger discussion about concepts.

Organized Sites can provide students with web-based simulations that they can manipulate to learn concepts.

Organized Sites can provide students with real-time databases they can use to interpret, make inferences, or predictions.

Network elements can function to promote inquiry and discussion about the relationship between ideas and concepts.

Attributes of Active Learning:

There are two types of generative activities that occur in Active Learning:

activities that generate organizational relationships (titles, headings, questions, objectives, summaries, graphs, tables, and main ideas), and

activities that generate integrated relationships between what the learner sees, hears, or reads and memory (demonstrations, metaphors, analogies, examples, pictures, applications, interpretations, paraphrases, inferences).

Lesson Plan Reflection Questions

Learning outcomes: What will the students be expected to learn?

Lesson description: How will Active Learning facilitate the learning outcomes?

Web resources: What types of web resources will support the learning strategy and learning outcomes?

Types of Web Resources well suited for Active Learning

Site Elements: numbers, narratives, images, animations

Organized Sites: databanks, interactive events, simulations

Network Elements: e-mail, chat rooms, conferencing

Collaborative Learning

Why does Collaborative Learning enhance learning?

Collaborative learning presumes that situations are dynamic, systemic, and changing. It is a framework that can be adapted to a particular situation to generate dialog between diverse communities, improve understanding, integrate scientific and public knowledge about a problem, increase rapport, trust, and respect among participants, and result in tangible improvements to a problem. Working together on instructional projects provides peers with different perspectives and opportunities to investigate subject matter at varying levels, justify and defend their ideas, and build deeper knowledge. To learn more about collaborative learning, see:

http://tecfa.unige.ch/tecfa/research/CMC/colla/iccai95_1.html

How can the World Wide Web support . . . Collaborative Learning?

Site elements can be used to provide multiple perspectives and representation of ideas, information, and solutions.

Organized sites can be used to provide examples of multiple perspectives on the subject area.

Network elements can be used to link "peers" on collaborative projects, for example listservs and chat rooms can become shared spaces for collaborating.

Attributes of Collaborative Learning:

Collaborative

(based on Schrage's model for collaborative communities)

Shared, understood goals; clear lines of responsibility; decisions not necessarily by consensus

Creation and manipulation of shared spaces

Multiple forms of representation: graphic, verbal, virtual, etc.

Continuous, but not continual communications; formal and informal environments; bonds, techniques, and skills on-going,

Participants actively involved in conceiving of and internalizing the materials.

Lesson Plan Reflection Questions

Learning outcomes: What will the students be expected to learn?

Lesson description: How will Collaborative Learning facilitate the learning outcomes?

Web resources: What types of web resources will support the learning strategy and learning outcomes?

Types of Web Resources well suited for Collaborative Learning

Site Elements: images, video clips, animations

Organized Sites:, interactive events, current events, historical events, showcases, simulations

Network Elements: e-mail, listservs, chat rooms, conferencing

Problem-based Learning

Why does Problem-based Learning enhance learning?

Learning is focused on solving a realistic problem that promotes consideration of different perspectives and development of deeper knowledge on a subject area. By placing students in the active role of problem-solvers confronted with an ill-structured problem which mirrors real-world problems students simultaneously develop problem solving strategies, disciplinary knowledge bases, and skills. To learn more about Problem-based Learning, see: http://www.imsa.edu/team/cpbl/problem.html

How can the World Wide Web support . . . Problem-based Learning?

Site elements or organized sites can be used to demonstrate, describe, or provide context for a problem.

Organized sites can be explored to identify information necessary to understand a problem.

Network elements can be used to have an outside expert provide context or multiple perspectives of a problem.

Attributes of Problem-based Learning:
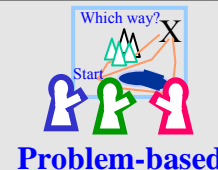
Adapted from Stepien, and Gallagher, (1993) and Barrows, H. (1985)

Problem-based

Reliance on problems to drive the lesson, problems do not test skills they assist in developing skills.

Problems are ill-structured - there is not one solution, learning is an iterative process, perception of problem and solution change.

Students solve problems - teachers coach and facilitate.

Guidelines are provided, not formulas, to approach problems.

Authentic, performance-based assessment.

Lesson Plan Reflection Questions

Learning outcomes: What will the students be expected to learn?

Lesson description: How will problem-based Learning facilitate the learning outcomes?

Web resources: What types of web resources will support the learning strategy and learning outcomes?

Types of Web Resources well suited for Problem-based Learning

Site Elements: narratives, images, video clips, sounds

Organized Sites: information, interactive events, current events, historical events, simulations

Network Elements: e-mail, listservs, chat rooms, conferencing

Role-Play

Why does Role-Play enhance learning?

Role-play methods provide an environment where learning is contextualized. Students are put into realistic roles that enhance transferability of knowledge. This encourages ownership of learning and the development of deep knowledge structures that are highly transferable to other situations. The learning context is generative in that students become actively involved in making mental connections and generating solutions. This method is based on the concepts of "anchored" instruction. See the following web site to learn more about the benefits of role-play and anchored instruction:
http://www.gwu.edu/~tip/anchor.html

How can the World Wide Web support . . . Role-Play?

Teachers can use:

- *sites elements* such as news clips, pictures, or graphics, to provide context for a problem.

- *organized sites* that "take students on" virtual field trips and virtual tours.

- *network elements* that encourage students to be involved in virtual situations.

Students can use:

- search *organized sites* that help solve problems,

- search for *site elements* such as pictures, graphics, video and audio clips that help them develop a solution to the problem.

- *network elements* to communicate with experts about the role they are playing.

Attributes of Role-Play:

Role-Play

Principles: Adapted From *Anchored Instruction* (John Bransford & the CTGV)

Activities should be designed around an "anchor" which frames the learning in a realistic and authentic setting.

- Curriculum materials should allow exploration by the learner to allow active manipulation, questioning, and involvement in the situation.

Lesson Plan Reflection Role-Play

Learning outcomes: What will the students be expected to learn?

Lesson description: How will Role-Play facilitate the learning outcomes?

Web resources: What types of web resources will support the learning strategy and learning outcomes?

Types of Web Resources well suited for Role-Play

Site Elements: narratives, images, animations, video clips

Organized Sites: information, interactive events, current events, historical events

Network Elements: e-mail, newsgroups, audio- and video-conferencing

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Web Resources

Web Resources Descriptions

Site Elements

Why would I want to use *Numbers* from the Web?

Numbers published on various web sites provide several advantages for instruction. First, finding existing banks of numbers on the web saves you the time of creating data for lessons and instructional activities.

Secondly, you can tap into existing stores of real-time (current numerical) data that make activities more exciting, realistic, and contextualized. For example, a database of current temperatures from around the country can be used in math or science classes for instructional activities on converting from Fahrenheit to Celsius or to graph differences between geographic regions.

Thirdly, real-time numeric data is often accompanied with descriptions of data structures, how the data were collected, and interpretations of the data trends. This supporting material can be used to teach data collection techniques by showing students how numbers are collected, recorded, analyzed, and used in occupational settings by research scientists, meteorologists, bankers, etc. These additional teaching points add depth to the learning process and help student to discover the how and why numbers are important.

Why would I want to use *Narratives* from the Web?

There are literally thousands of narrative references available on the web that provide short description, examples, or notes that can support almost any topic you can think of. Web-based narratives can be easily accessed when a student is ready to read the information, not when he or she has time to go to the library.

Existing narratives on the web can be used to elicit inquiry into new topics, create interest around current events, or provide access to information not normally available in the classroom, such as an overview of a specific aeronautics research project or a scientist's response to the question "why planes fly?"

Why would I want to use *Lists of References* from the Web?

Finding a List of References is like striking gold! Not only does it cut down on your preparation time, lists of references often provide access to valuable resources that are only available on the web.

The World Wide Web is a giant network of links to information and resources that provide access to other sources of information you may not have easily found. Lists of References make your (or your student's) quest for information easier by providing active links to sites based on specific topics such as lists of lessons and projects available to science teachers, lists of sites related to flying aircraft, or lists of lists!

Web Resources

Why would I want to use *Still Images* from the Web?

One of the powerful attributes of the web is its capability to display graphics and images. Still images on the web include line drawings, cartoons, photographs, and combinations of colors and shapes. When it is difficult to find images in a library, book, magazine, or newspaper, you can generally search the web and find just the right image to support your instructional needs.

Why would I want to use *Animations* from the Web?

Video- and computer-based animations are costly and time consuming to create. Not only does the web have the capability to display animated pictures, there are literally thousands to choose from! And, they can be found to support almost any subject area.

Animations on the web consistently demonstrate the same movement so that students can look at it over and over and analyze the details. There are also an abundance of animated pictures that are free to be used on web sites you may have your students construct.

Why would I want to use *Video Clips* from the Web?

The web provides large archives of video clips not easily accessible from anywhere else. There are databases that represent past and current events and people, such as the first steps on the moon and the recent images from Mars. Easy access and a multitude of resources make web-stored video clips an efficient resource, as opposed to having to order a film from a library or clearing house.

Why would I want to use *Sounds* from the Web?

The web has the capability to store and play sound clips. Sound clips are available which include famous speakers or radio shows, or sound effects such as jets taking off, doors closing, or someone laughing. The web provides a ready-made resource of sounds that can be used to attract attention, motivate students, provide historical information from actual events, provide the reader with a story context, or give feedback.

Why would I want to use *Tools* from the Web?

The web offers the teacher and student many types of tools to facilitate instruction and learning, such as temperature conversion calculators, statistics packages, and specific search engines. Free plug-ins that enable displaying graphics more effectively and allow audio and video capabilities are also available to download to your computer.

Web Resources

Network Elements

Why would I want use *Experts and Scientists* in my classroom?

Wouldn't it be great if you could have your students correspond directly with experts and scientists about the structure of the solar system? Wouldn't it be a valuable experience to have an expert available to answer your questions or to have access to fellow teachers to discuss the use of technology in the classroom? Access to experts provides you and your students with information from people who know and practice subject matter.

There are many possibilities for using experts and scientists to enhance instruction. Students could email experts to ask specific questions about a topic they are studying. You may arrange for experts to web conference with your class to describe a content area or participate in a question and answer session. You may communicate with experts to gain background knowledge, get feedback on teaching ideas, or to get answers to questions your students ask and you do not know how to answer.

Why would I want to use *Leaders and Role Models* in my classroom?

How would you like to have people who are leaders or role models in a particular area work with your students. Leaders and role models provide a certain perspective that can bring topics alive and inspire students. They often can bring a big picture overview and talk about how students can get involved in areas or interest or prepare themselves for similar careers. Leaders and role models may join your class through email conversations, chats, on-going conversations or perhaps by critiquing student projects, suggesting areas of additional study, provided authentic problems to think about that they have or are tackling.

Why would I want to use *Collaborators* in my classroom?

Kids pass notes back and forth to each other all the time. What if you could harness that need to communicate and focus it on school subjects? Wouldn't it be great to have students enthusiastically discussing a science project or how to solve a math problem with each other? Bringing collaborators into your classroom allows you or your students to interact with other people on the same project, providing multiple perspectives and ideas. There are multiple tools on the web to facilitate these collaborations including: chat rooms, audio conferencing, video conferencing and newsgroups.

You can chat during class time when students are in the midst of learning new topics or need new ideas about projects. Or, have a group of students find and participate in a chat room that is related to a project they are developing and then report back what others in the chat room had to say and how their comments changed or did not change their approach.

You might also use audio conferencing or video conferencing Audio conferencing allows you or your students to talk in real-time with other people online. You can have your students discuss or debate new topics and ideas with students from other schools. This is especially effective when you have sound-capable Internet computers, but not the video cameras and connections necessary for video transmissions.

Web Resources

What would it be like to talk face-to-face with an astronaut? Wouldn't you like to bring students from around the world into your classroom to describe how it is different living in other countries? Isn't it interesting to see what people wear, how their classrooms are set up, body language they use during conversations, and hear how they talk? And, how many times have you wanted to go on a field trip and not had the funding or time to do so? One of the most compelling lures of the Internet may well be the ability to communicate inexpensively in real time, via desktop conferencing.

You could also use Newsgroups for collaborative activities. Newsgroups are like a giant, worldwide bulletin board that is available to anyone on-line. Newsgroups can put you in touch with people with similar interests, computer or science experts, and individuals from around the world. Because they are devoted to specific topics, newsgroups are an incredible homework resource as well! Students could use Newsgroups to find discussion trends in current events or to gather information on the different perspectives of a growing interest in the space program and international space station.

Organized Sites

What are *Information* sites?

A majority of the sites on the web are informational in nature. Information sites provide explanations of ideas or concepts, describe a specific problem or issue, provide an account of an event, or allow discovery of a place that is of interest. Graphics, text, and models are often used to provide intricate descriptions. Many information sites have links to "Ask the expert" sites and other discussion groups. Information sites may provide links to different perspectives, illustrations or images of the issue, options to participate in discussions, or descriptions of potential solutions to problems.

Information sites provide a rich source of a data on topics that may be difficult to find in school references. The information on the web is generally more current than textbooks and may offer a variety of viewpoints on historical events, scientific discoveries, social issues… on just about any topic you choose.

Information sites are particularly useful to describe issues, concepts, or ideas that are outside the expertise of the teachers. They are also valuable for students who want to dig deeper into subjects of interest.

What are *Databank* sites?

Databank sites are storage areas for numeric-, graphic-, or text-based data. These data can either be historical or real-time, meaning updated to reflect up to the minute information.

Databanks are ready-made sets of data that can be used in math and science projects for demonstrations or for analysis of current natural phenomena such as weather fronts or hurricanes. Providing data that is real and sometimes up to the minute is motivating and contextualizing to students. Multimedia databanks can be used to find pictures, animations, and video/audio clips representing specific subjects. These can be used to support the presentation of instructional lessons or as resources to enhance student projects.

Web Resources

What are *Interactive Event* sites?

Interactive Event sites provide students with opportunities to actively engage in projects that are conducted with experts and/or other schools. They may include participating in on-line discussions, data collection and reporting, or submitting specific projects based on current research.

These types of sites generally provide all of the instructional and support material and directions required to conduct a lesson. Topics of the interactive events often include current scientific issues or the use of new technologies. Experts are generally available to work with students in the learning process.

What are *Current Events* sites?

Current Event sites are generally driven by daily or even hourly news. They often are in the format of a news broadcast or newspaper and are updated regularly. They contain links to different perspectives of an event and may contain stories and up-to-date reports, video clips, pictures, audio clips, live broadcast, interactive surveys, communication links, and references to alternative views of the event.

Current Event sites are a rich source of live, realistic topics that tie education to real-world applications. Topics of interest to students from discovery of new planets to environmental protests to sporting events are often the subject of conversation in the lunchroom. Bringing topics on current news related to the newest technology advancements in flight and space travel can increase motivation and interest levels of students studying science principles or math concepts.

What are *Historical Events* sites?

Historical Event sites provide archival information on past events. They provide insights, facts, perspectives, and records from past occurrences. Historical event sites often use text, graphics, first-hand accounts (video or audio clips), links to old newspapers and documents, pictures or paintings illustrating events, and communication links to discuss the significance of past events as related to today.

Historical Events provide a basis for understanding where we were in the past and how we came to be the way we are today. In our history we can see how scientific inquiry evolves, how flight progressed from the Wright brothers to the space shuttle, how we discovered molecules, and how we have come to understand genetics. Often historical event sites contain time lines as well as models or simulations illustrating the development of ideas. And what could be more powerful than hearing from and talking with an historical figure such as an astronaut, the first person to cross the sound barrier, or the discoverer of a new medicine?

What are *Showcase* sites?

Showcases sites are maintained on a national, state, district, and local school levels to provide a common space for students to display their work to others. Also, many showcase sites are available at large project Websites. Many showcases hold contests to evaluate projects submitted and may offer prizes to the best submissions.

Web Resources

Teachers can have students review showcase sites to get ideas for projects. More importantly, students can be encouraged to show off their work by submitting projects to showcase sites.

What are *Simulation* sites?

Simulations provide hands-on models of concepts in action. They often incorporate explanations, animations, graphics, multiple variables, or calculators that illustrate complex systems or processes such as designing an airplane. Simulation can either demonstrate an activity or allow the learner to manipulate variables and run different scenarios.

Simulations provide students with the ability to manipulate variables in a contained and controlled environment to "see what happens." Students who have an opportunity to manipulate variables on a model can comprehend the principles associated with the entire phenomena. For example by manipulating the wing span and fuel capacity of an aircraft, students can discover some of the principles associated with designing aircraft.

What are *Tutorial* sites?

Tutorials incorporate instruction, examples, explanations, visualizations, and practice. Often they incorporate communication strategies for asking questions and problem-solving as well as the ability to link into conversations about the tutorials topics, such as creating Web sites, using software packages, or building models.

Existing Tutorials provide instruction and practice on many topics. They can be used as prerequisite activities to prepare students for class projects or to encourage students to explore topics of interest to them. Because tutorials are stand-alone and therefore do not require any additional support to use, they can be used as individualized instruction to provide remedial and advanced instruction to learners.

Merging Methods and Resources to Create WELES

The matrix below identifies combinations of teaching methods and resources that make the most sense based on their purpose for instruction. A *Present* strategy is suited to providing students with information using a *frame or inform* strategy. Note also that for this method sites or other people through the network can carry this information. The *Guide* strategy is suited for all four lesson strategies using either sites or network Web resources. *Active Learning* is more suited for *framing, exploring* new content or *trying* out new ideas. Only in the framing context, does using the network make sense. For framing lessons, listservs and newsgroups can be rich with real problems to solve. *Collaborative learning* is suited for working with others, or networking, using the *frame* or *explore* lesson strategies. Problem-based learning can use site and network elements to *frame, explore and try*. The network would not be useful for a problem-based *try* WELES. Finally, both sites and networks provide rich resources for role-playing for a *frame, exploration* or *try* WELES.

	Frame		Inform		Explore		Try	
	Sites	network	sites	network	sites	network	sites	network
Present	X	X	X	X				
Guide	X	X	X	X	X	X	X	X
Active Learning	X	X			X		X	
Collaboration		X				X		
Problem-based	X	X			X	X	X	
Role-Play	X	X			X	X	X	X

Now, how do you use the WELES framework to create lesson plan? The next two pages introduce the WELES lesson planner. This tool helps to guide you through the process of creating a lesson plan and then enhancing it with web resources. You can use the lesson planner to write down the activities within your lesson, identify the resources you will need for the activities, and then use that information to strategically search of web resources you need. Another approach is to start with a really cool web resource you found and create a lesson around the resource ... or you can start with a lesson you think is in need of enhancing and use the lesson planner to help you think of web resources that might help you enhance the lesson.

MERGING METHODS AND RESOURCES TO GET WELES

To begin seeing how WELES can help you, practice using the lesson planner … eventually, with practice you will begin to develop your own strategy and no longer need the lesson planner … The following pages provide an example of a lesson on the solar system that was enhanced with a variety of web resources… take a look …

NOTES:

Sample Lesson Plan Narrative: Space Science Related Subject Matter

The teacher who developed this lesson plan was responsible for teaching a sixth grade unit on the solar system. She needed to cover several educational standards. In the past, she gave students a reading on the planets, showed a film on the solar system, and conducted discussions on the solar system using a solar system model in her room. This was followed by a test. The unit before this one was on studying the earth including geologic features and life cycles. She was not satisfied that the current lesson was very interesting or that the students were learning much beyond memorizing the names and orders of the planets. She decided that the lesson needed some enhancements.

Thinking about the lesson, and using the WELES reflection tool, the teacher wrote down the lesson objectives and standards and began to think about how to make the lesson more exciting and motivating. Some students had commented on a news story with pictures from Mars so she thought that sharing such pictures with her students would be a good start. She added a demonstration with an astronomer she met at a teacher workshop. And planned collaborative projects where students worked together to create descriptions of each planet and then as a class create a representation of all the planets. Standards addressed included:

MS&T: Analysis, Inquiry, & Design	Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.
MS&T: Information Systems	Students will access, generate, process, and transfer information using appropriate technologies.
MS&T: Mathematics	Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry.
MS&T: Science	Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.
MS&T: Technology	Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs.
MS&T: Interconnectedness: Common Themes	Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning.
MS&T: Interdisciplinary Problem Solving	Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions.
Social Studies: Geography	Students will use a variety of intellectual skills to demonstrate their understanding of the independent world in which we live- local, national and global- including distribution of people, places, and environments over the earth's surface.
English Language Arts: Language for Information & Understanding	Students will listen, speak, read, and write foe information and understanding. As listeners and readers, students will collect data, facts, and ideas; discover relationships, concepts, and generalizations; use knowledge generated from oral, written and electronically produced texts. As speakers and writers, they will use oral language that follows the accepted conventions of the English language to acquire, interpret, apply, and transmit information.

The following lesson planner documents her specific thoughts on this Solar System lesson.

WELES LESSON PLANNER

Subject

⊠ **Science**

$2 * 6 = 2x(x$

❏ **Mathematics**

❏ **Technology**

❏ **Geography**

❏ **Social Studies**

A B
C D

❏ **Language Arts**

Teaching Method

⊠ **Present**

⊠ **Guide**

Flight

⊠ **Active Learning**

⊠ **Collaborative**

Which X
St

❏ **Problem-based**

⊠ **Role Play**

Web-Enhanced Lesson

Grade: *6*

Lesson: *Solar System.*

Lesson Objective(s): *Describe the similarities and differences among each of the planets in our solar system and earth.*

Education Standard(s):

Content: Earth and Planetary Science

Process: Math, Science, & Technology: Analysis, Design, and Inquiry; Information Systems; Math; Science; Technology; Interconnectedness; Problem-Solving; Soc. Studies: Geography; English/Lang Arts: Communicating and Understanding

Lesson Activities	W E L E S
• *Create interest: show short video clips and pictures of planets in solar system – prompt students to 'guess' which planet is in the picture.*	*Frame*
• *Conduct question and answer session on features of the earth (previous unit) and what students think are characteristics of other planets*	*Inform*
• *Discuss planets with expert/scientist.*	*Inform*
• *Students to work in groups to develop descriptions of each planet, each group with a different planet– explore multiple resources*	*Explore*
• *Class creates a giant picture or encyclopedia of planets in our solar system; describes similarities/ differences compared to earth.*	*Try*

Web Resources

SITE ELEMENTS
Numbers
Narratives
List of references
⊠ Still Images
⊠ Animations
⊠ Video clips
Sounds
Tools

ORGANIZED SITES
⊠ Information
Databanks
Interactive Events
Current Events
⊠ Historical Events
Showcases
⊠ Simulations
Tutorials

NETWORK ELEMENTS
⊠ Experts
Leaders
⊠ Scientists
Role Models
Collaborators

WELES LESSON PLANNER
Web Resource Worksheet

Lesson Activity	Resources Required	Web Resources Found
Create interest by showing short video clips or pictures of the planets in our solar system – prompting students to 'guess' where the picture is from.	*Teacher Background information on each planet* *Video clips of solar system* *Pictures of each planet (un labeled) (to project or handouts)*	Solar system activities: http://spacelink.nasa.gov/Instructional.Materials/Curriculum.Support/Space.Science/Our.Solar.System/.index.html Educator guides: http://spacelink.nasa.gov/Instructional.Materials/Curriculum.Support/Space.Science/
Conduct questioning session on characteristics of the earth and other planets – create matrix	*Background information on planets(distance from sun atmosphere, size, moons, landscape, life, etc.)* (NOTE: *math application on magnitude of numbers – size/distance, ratios –planet size)*	*See above*
Discuss planets with astronomer.	*Astronomer or communication network to astronomer*	Ask a space scientist site: http://science.msfc.nasa.gov/faq/ask-a-scientist.htm Ask about the sun, planets and SOHO space craft: http://sohowww.nascom.nasa.gov/explore/drsoho.html
Students to work in groups to develop a description of each planet, each group with a different planet or celestial body in our solar system	*Descriptions of planets / solar system* *Pictures of planets / solar system* *Example projects* *Grading rubrics* *Paper, markers, paint, tape, etc.*	Planetary photojournal: http://photojournal.jpl.nasa.gov/ Info on each planets characteristics - http://www.nineplanets.org/ Solar system simulator: http://space.jpl.nasa.gov/ Imagine the Universe: http://imagine.gsfc.nasa.gov/docs/homepage.html Chronology of Lunar and Planetary Exploration: http://nssdc.gsfc.nasa.gov/planetary/chrono.html

WELES brings together teaching strategies, different components of a lesson, and web resources to enhance instruction. In this example, a science lesson on the planets is being given using *present*, *guide* and *collaborative* methods. The teacher has used the Web Resource Worksheet to identify resource requirements for each activity and then to help search for specific web resources. The example illustrates the use of sites with *present* and *guide* teaching methods to *frame* and *inform* students. Students use other resources to *explore* and *try*. In this example the students also use *network elements* to discuss the planets with experts / scientists in astronomy.

Sample Lesson Plan Narrative: Non-Space Science Related Subject Matter

The teacher who developed this lesson plan was responsible for teaching a sixth grade unit on converting measures from US to metric. He generally showed students the conversation formula, had them look at the markings on both a U.S. standard rules and a metric ruler, and complete a series of exercises converting numbers (whole number, fractions, decimals, etc.) to different units and standards of measures. These exercises were generally followed by a test.

He was not satisfied that the current lessons were very interesting or that the students were learning much. He decided that the lesson needed some enhancements.

Thinking about the lesson and recent introduction to NASA space science, the teachers used the WELES reflection tool and lesson planner to revised the lesson. First he wrote the lesson objectives and standards. He then began to think about what he would like to do to make the lesson more exciting and motivating to the kids and to enhance the lesson. There was just a story on the news about how the Mars Landers crashed and that the reported reason was that scientists failed to convert to the same measurement standards. He thought that sharing this story with the students would catch their attention and then using measures of planets, distance between them, their sizes, etc. the kids would be more involved in the activities and perhaps learn the conversion processes more quickly.

He decided to use the news story to open this math lesson, provide the kids with a variety of resources with information about the measurements of the planets, and work as a class to determine what types of measurement information about the planets was needed to plan a trip to each. They would make a giant matrix on the chalkboard to identify key information and the students would go to a variety of resources to find the information. Then, they would work in teams to develop their own matrix of the measures, reported in both US and metric standards. As a class they would share their results. Then, they would use a computer-based converter to check the master matrix.

Standards addressed: **Standard 3**

Mathematical Reasoning	Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence, and construct an argument.
Number and Numeration	Students use number sense and numeration to develop an understanding of the multiple uses of numbers in the real world, the use of numbers to communicate mathematically, and the use of numbers in the development of mathematical ideas.
Modeling/Multiple Representation	Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships.
Measurement	Students use measurement in both metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.
Uncertainty	Students use ideas of uncertainty to illustrate that mathematics involves more than exactness when dealing with everyday situations.

The following lesson planner documents his specific thoughts on this math conversion lesson.

WELES LESSON PLANNER

Subject

☐ **Science**

$2 * 6 = 2x(x$

☒ **Mathematics**

☐ **Technology**

☐ **Geography**

☐ **Social Studies**

A B
C D

☐ **Language Arts**

Teaching Method

☒ **Present**

☒ **Guide**

Flight

☒ **Active Learning**

☒ **Collaborative**

Which
X

☐ **Problem-based**

☐ **Role Play**

Web-Enhanced Lesson

Grade: *6*

Lesson: *Converting between US and metric standards.*

Lesson Objective(s): *Convert a variety of measures from US to metric and metric to US standards*

Education Standard(s): Standard 3

Mathematic reasoning, number and numeration, modeling, measurement, and uncertainty

Lesson Activities

	W E L E S
• *Motivate kids with story of Mar Lander crashes … show pictures, describe conversion problem*	*Frame*
• *Show several examples of how to convert between US and metric*	*Inform*
• *Brainstorm the types of measure that would need to be taken for a similar space mission, e.g., planet distance,*	*Inform*
• *Students search for information on planets (from brainstorm)*	*Explore*
• *Students work in teams to develop chart of information on planets with both US and metric measures*	*Explore*
• *Team report information, post of class matrix,*	*Try*
• *Teams use conversion program to check all answers.*	*Try*

Web Resources

SITE ELEMENTS
- Numbers
- Narratives
- List of references
- ☒ Still Images
- ☒ Animations
- ☒ Video clips
- Sounds
- ☒ Tools

ORGANIZED SITES
- ☒ Information
- Databanks
- Interactive Events
- Current Events
- Historical Events
- Showcases
- Simulations
- Tutorials

NETWORK ELEMENTS
- ☒ Experts
- Leaders
- ☒ Scientists
- Role Models
- Collaborators

WELES LESSON PLANNER
Web Resource Worksheet

Lesson Activity	Resources Required	Web Resources Found
Motivate kids with story of Mar Lander crashes … show pictures, describe conversion problem	*Background on Mars Lander problems* *Pictures of Mars Lander*	Mars Orbiter website: http://mars.jpl.nasa.gov/msp98/news/mco990930.html
Show several examples of how to convert between US and metric	*Examples of conversions needed in Mars Lander mission*	Mission details: http://mars.jpl.nasa.gov/msp98/orbiter/moi.html
Brainstorm the types of measure that would need to be taken for a similar space mission, e.g., planet distance,		
Students search for information on planets (from brainstorm)	*Information on Planets*	Planetary photojournal: http://photojournal.jpl.nasa.gov/ Info on each planets characteristics - http://www.nineplanets.org/ Solar system simulator: http://space.jpl.nasa.gov/ Imagine the Universe: http://imagine.gsfc.nasa.gov/docs/homepage.html
Students work in teams to develop chart of information on planets with both US and metric measures … Team report information, post of class matrix		
Teams use conversion program to check all answers.	*Metric conversion tools*	Unit conversion site: http://www.convert-me.com/en/

Now its your turn .. the next several pages are blank lesson planners … remember, they are simply a framework to help you think about what you want to teach, how you would like to teach it, and what resources, including web resources you need.

WELES LESSON PLANNER

Subject

- **Science**
- **Mathematics**
- **Technology**
- **Geography**
- **Social Studies**
- **Language Arts**

Teaching Method

- **Present**
- **Guide**
- **Active Learning**
- **Collaborative**
- **Problem-based**
- **Role Play**

Web-Enhanced Lesson

Grade:

Lesson:

Lesson Objective(s):

Education Standard(s):

Lesson Activities	W E L E S
•	_____
•	_____
•	_____
•	_____
•	_____

Web Resources

Site Elements
- Numbers
- Narratives
- List of references
- Still Images
- Animations
- Video clips
- Sounds
- Tools

Organized Sites
- Information
- Databanks
- Interactive Events
- Current Events
- Historical Events
- Showcases
- Simulations
- Tutorials

Network Elements
- Experts
- Leaders
- Scientists
- Role models
- Collaborators

WELES LESSON PLANNER
Web Resource Worksheet

Lesson Activity	Resources Required	Web Resources Found

WELES LESSON PLANNER

Subject

- ❏ **Science**
- ❏ **Mathematics**
- ❏ **Technology**
- ❏ **Geography**
- ❏ **Social Studies**
- ❏ **Language Arts**

Teaching Method

- ❏ **Present**
- ❏ **Guide**
- ❏ **Active Learning**
- ❏ **Collaborative**
- ❏ **Problem-based**
- ❏ **Role Play**

Web-Enhanced Lesson

Grade:

Lesson:

Lesson Objective(s):

Education Standard(s):

Lesson Activities	W E L E S
•	_____
•	_____
•	_____
•	_____
•	_____

Web Resources

Site Elements
Numbers
Narratives
List of references
Still Images
Animations
Video clips
Sounds
Tools

Organized Sites
Information
Databanks
Interactive Events
Current Events
Historical Events
Showcases
Simulations
Tutorials

Network Elements
Experts
Leaders
Scientists
Role models
Collaborators

WELES LESSON PLANNER
Web Resource Worksheet

Lesson Activity	Resources Required	Web Resources Found

Appendices

WELES Terminology

An Approach to using WELES

Technology Integration Issues

Hints for Searching the Web

Cited References

Appendices

Web-Enhanced Learning Environment Strategies Terminology

This matrix provides a list of key WELES terms and terms other educators have suggested that are synonymous. This list is provided merely as a reference. There is not necessarily an exact match in definitions between the two lists. Please refer to the definitional pages throughout the WELES book for the exact meaning of the WELES terms.

WELES	Synonymous Terms	Your Terms
Methods of Teaching • Present	• Expository Presentation • Lecture • Giving responses • Direct Instruction	
• Guide	• Inquisitory Presentation • Discovery learning • Group discussion • Questioning strategies	
• Active Learning	• Generative learning • Hands-on Minds-on learning • Active participation	
• Collaborative Learning	• Peer group collaborations • Cooperative learning groups	
• Problem-based Learning		
• Role-Play	• Anchored Instruction • Contextualized Participation	
Lesson Strategies • Frame	• Anticipatory set • Goals / objective setting • Motivate students • Gain attention	
• Inform	• Modeling, teaching • Presenting stimulus materials	
• Explore	• Practice and guided practice • Independent practice • Elicit performance • Drill and practice	
• Try	• Closure • Follow-up • Evaluation / testing • Evaluate performance	

Appendices

An Approach to using WELES

Use the lesson planner to:

1. Select the subject area you will be teaching

2. Select the methods of teaching you plan to use

3. Write lesson objectives and document educational standards

4. Write a brief outline of the lesson; frame, inform, explore, try

5. Select ideal types of information or human resources required

6. Factor in limitations, such as type of internet access available

7. Select types of web resources you will search for to support lesson

8. Develop a search strategy

9. Find the resources

Appendices

Technology Integration Issues

Issue	Description	Possible Solutions
Access / available configurations	❑ Access to internet connected computers for teachers and students, e.g. number of computers, time available, projection equipment, etc. ❑ Access to required web sites	
Acceptable Use Policies	❑ Rules for using technology in school, e.g., when, where, how, what, permissions, consequences	
Copyright	❑ Legal use of information, e.g. text, graphics, etc, for educational purposes	
Censorship	❑ Banning cites for content	

Appendices

Issue	Description	Possible Solutions
Social	❑Isolating students from teacher and peers during instructional periods	
Skills/Knowledge	❑Level of skills and knowledge to access and use internet technology, both teacher and students	

Appendices

Hints for Searching the Web

This list is a summary of hints for increasing your efficiency in searching the web. It is by no means a comprehensive list as there are many different types of search strategies and tools.

Let's review some strategies--mini exercises

■ BROWSE -- Search a directory to find resources
  ◆ Yahoo!
    • Go to the homepage
    • search for a series of words
    • follow the hyperlinks
    • BOOKMARK!

• Probably one of the most time consuming search strategies, especially if you don't know exactly what you are looking for . . . however, following the links on the search engine pages can help to limit your browsing, for example: following the education or science links in Yahoo.

Strategies continued..

■ Search for a specialized database
  ◆ www.isleuth.com

• Use specialized databases such as isleuth, which specific databases such as web site review or news databases.

Engines or directories

■ AltaVista
■ Excite
■ HotBot
■ Infoseek
■ Lycos
■ Open Text
■ WebCrawler

• If you can't find what you are looking for in one search engine, use different search tools

• Search using words that related specifically to the type of resources you are looking for, for example animal pictures, cloud formation animations, or jet sounds.

• Review the search tool's *help* to get hints on limiting or expanding searches, such as how to do phrase searching using quotes (" ") to make sure that the search is limited to sites with all the specified words in the string or using Boolean logic using "and," "or," and "not" to limit or expand your search.

Appendices

Search using a Meta-search Tool

- Searches search engines
- http://metacrawler.com
- http://www.search.com
- http://www.cs.colostate.edu/~dreiling/

- If you can't find what you are looking for and want to search many of the search engines at once, try meta-search tools.

Search a Usenet Archive

- EMAIL or discussion group archive
- www.dejanews.com

- If you are looking for conversation groups or people to talk to about specific topics, check out Usenet archives.

Search using the Internet Public Library

- www.ipl.org

- If you are looking for reference materials you may want to try looking at the Internet Public Library.

Search via a search engine

- Identify the important concepts of your search
- Choose keyword to describe it
- THINK about synonyms
- Choose a search engine!
- Read the instructions!
- Create a search string
- View the results--and modify if needed

- Remember to think about what you want to find and conduct focused searching.

APPENDIX: METHODS OF TEACHING

Worksheets

The Methods of Teaching Worksheet on the facing page is provided to help you think about which teaching methods you use predominantly in your classroom.

Instructions for completing the Methods of Teaching Worksheet

1. Read the teaching activities presented in the first column of the worksheet.

2. Use the following scale to indicate the likelihood of your using each activity specified in column 1:

    > 0 = I never use this teaching activity
    >
    > 1 = I occasionally use this teaching activity
    >
    > 2 = I often this activity

3. Score each activity as 0, 1, or 2, based on the rating scale provided above.

4. Write the score in all of the open boxes in the row for each activity.

For example, if you occasionally "Use questioning, conversational activities . . ." write "1" in the corresponding box in the second column (see below). If you never "Present content rules using feedback" write "0" in the corresponding box (see below). And, if you often "Present rules using pictures, . . ." write a "2" in both the first and second column boxes (see below).

EXAMPLE:

Which teaching activities do you use?	1st	2nd	3rd	4th	5th	6th
Use questioning, conversational activities with student		1				
Present content rules using feedback		0				
Present rules using pictures, context and prerequisite information	2	2				

5. Repeat the process for all of the activities listed on the worksheet.

6. After responding to all of the items on the worksheet, add up the total for each column and write the total in the top box. You should have a total score for each of the six columns.

APPENDIX: METHODS OF TEACHING

Which teaching activities do you use?						
Use questioning, conversational activities with student						
Present content rules using feedback						
Present rules using pictures, context and prerequisite information						
Present examples of concepts						
Conduct activities where two or more students work together						
Encourage development of shared goals for learning activities						
Encourage continuous communication within student learning groups						
Allow student groups to work independently						
Involve students actively in conceiving and internalizing material						
Tell, illustrate, show information						
Use mnemonics in teaching						
Use activities that encourage forming mental connections between concepts						
Use activities to help student generate organizational relationships						
Use activities to help student integrate relationship between prior knowledge and what they see, hear, or read						
Anchor activities to contextualize problem-solving						
Allow students to actively manipulate and explore cases						
Put students in problem solving roles						
Encourage collaboration						
Provide complex, realistic environments for learning						
Present problems in narrative or story format with embedded data						
Contextualize learning so that students identify with problem and become involved in problem-solving						
Create activities with multiple solutions						
Create situations in which problems drive the lesson						
Coach students as they solve problems						
Provide students with guidelines on how to approach the problem, not formulas to solve problems						
Provide authentic, performance-based assessment, seamless to instruction						

APPENDIX: METHODS OF TEACHING

Interpreting the worksheet

Compare your column scores with the score in each category of the Methods of Teaching worksheet on the facing page. The closer your column scores are to the maximum scores possible for each column, the more likely you teach using those methods. Your scores should convince you that the methods of teaching shown in this tool are not new to you! While most teachers use some of each of the methods, many gravitate to a few predominant ones. After completing this section of the handbook, you should review those WELES that match *your* teaching style first.

A brief description of each teaching method follows.

Present methods are those in which the teacher provides instructional information through lecture, presentation, demonstration, or other telling activities. The teacher is in control of presenting the content as he/she specifically directs the students through the lesson, activity, or practice session. The teacher focuses the students' attention on key points and may use graphics, diagrams, etc.

Guide uses inquiry activities to help students discover rules and relationships of the content. The teacher's role shifts from presenter to activator of conversation with students. The teacher is a coach by questioning, providing context, drawing upon prior and prerequisite knowledge, giving feedback, and providing help.

Active Learning occurs when the student is mentally active and constructs meaningful and personal understanding of the content by manipulating objects or abstract concepts in the learning environment. Instructional activities such as note taking, concept mapping, graphing, and mnemonics enable students to mentally "play with" information.

Collaborative Learning occurs when two or more *peers* work together on learning activities that force them to maintain agreement and eventually reach a shared solution. The process encourages discussion of ideas, collaborative argument, and interaction among participants especially when those participants begin the discussion with little in common.

Problem-based Learning starts with a presentation of a "real world" problem in which students, provided with instructor's guidance and resource material, are encouraged to dive into the problem, construct an individual understanding, and finally find a solution. Students actively define problems and construct potential solutions while teachers model, coach, support, and make explicit students' learning processes.

Role-Play activities require putting the students in the context of a problem-based story in order to learn. The students "play" authentic roles while investigating a situation, identifying gaps in their knowledge, researching information needed to solve the problem, and developing solutions. The teacher's role is to coach.

APPENDIX: METHODS OF TEACHING

Which teaching activities do you use?	Present P 8	Guide G 10	Active Learning A 16	Collaborative C 14	Problem-based PB 20	Role-Play R 28
Use questioning, conversational activities with student		X				
Present content rules using feedback		X				
Present rules using pictures, context and prerequisite information	X					
Present examples of concepts	X	X				
Conduct activities where two or more students work together				X		
Encourage development of shared goals for learning activities				X		X
Encourage continuous communication within student learning groups				X		
Allow student groups to work independently				X		
Involve students actively in conceiving and internalizing material		X	X	X	X	X
Tell, illustrate, show information	X					
Use mnemonics in teaching	X					
Use activities that encourage forming mental connections between concepts			X			
Use activities to help student generate organizational relationships			X			
Use activities to help student integrate relationship between prior knowledge and what they see, hear, or read			X			
Anchor activities to contextualize problem-solving						X
Allow students to actively manipulate and explore cases			X	X	X	X
Put students in problem solving roles						X
Encourage collaboration				X	X	X
Provide complex, realistic environments for learning						X
Present problems in narrative or story format with embedded data					X	X
Contextualize learning so that students identify with problem and become involved in problem-solving			X		X	X
Create activities with multiple solutions			X		X	X
Create situations in which problems drive the lesson					X	X
Coach students as they solve problems		X	X		X	X
Provide students with guidelines on how to approach the problem, not formulas to solve problems					X	X
Provide authentic, performance-based assessment, seamless to instruction					X	X

APPENDIX: TEACHING AND LEARNING RESOURCES

The Teaching and Learning Resources Worksheet on the facing page is provided to help you think about the types of teaching *materials* you currently use in your classroom.

Instructions for completing the Teaching and Learning Resources Worksheet

1. Read the resources that are listed in the first column of the worksheet.

2. Use the following scale to indicate the likelihood of your using each resource specified in column 1:

> 0 = I never use this resource
>
> 1 = I occasionally use this resource
>
> 2 = I often this resource
>
> W1= I wish I **could** use this resource occasionally
>
> W2= I wish I **could** use this resource often

3. Score each resource as: 0, 1, 2, W1, or W2 based on the rating scale provided above.

4. Write the score in all of the open boxes in the row for each resource.

For example, if you occasionally use "Entertainment such as puzzles, games, music" write "1" in the corresponding box in the second column (see below). If you never use "Guest Speakers" write "0" in the corresponding box in column 3 (see below). If you often use "Music or sounds" write a "2" in the box in the first column (see below). If you never go on "Field trips" but you wish you could occasionally, write W1 in columns two and three (see below).

EXAMPLE:

Which resources do you use in the classroom?	1ˢᵗ	2ⁿᵈ	3ʳᵈ
Entertainment such as puzzles, games, music		1	
Guest speakers			0
Music or sounds	2		
Field trips		W1	W1

5. Repeat the process for all of the resources on the worksheet.

6. After responding to all of the items on the worksheet, add up the total for each column and write the total in the top box. There should be a total score for each of the three columns.

APPENDIX: TEACHING AND LEARNING RESOURCES

Which resources do you use in the classroom?			
Textbooks, story books			
References materials such as dictionaries, encyclopedias, scientific journals			
Workbooks, worksheets, or handouts			
Data sets			
Graphs and charts			
Maps			
Pictures, Photographs			
Newspaper Articles			
Posters			
Newsletters, your own or others			
Computer-based instruction			
Advertisements from magazines, newspapers, or television			
Videotapes or films			
Television			
Records, audio-tapes, CDs, or radio			
Manipulatives such as scientific instruments and models			
Video teleconferences			
Audio teleconferences			
Letters to students in other schools or regions			
"Peer" teachers			
Entertainment such as puzzles, games, music			
Guest speakers			
Music or sounds			
Field trips			

APPENDIX: TEACHING AND LEARNING RESOURCES

Interpreting the worksheet

Compare your column scores with the scores for the categories of Web Resources on the next page. The closer your column scores are to the maximum scores possible for each column, the more likely you teach using those resources. Your scores should convince you that the types of teaching resources shown in this tool are not new to you! What your score may also show you is what *other* resources you would use if they were available. While most teachers use many resources, many teachers will use a few predominant ones. After completing this section of the handbook, you should review those WELES that use the type of resources you are most comfortable with first.

A brief description of each web resource follows.

Site Elements represent the raw material from which lessons can be created. These web resources can be used to *frame*, or set a lesson within a real or imaginary context, be used to *inform* students about the content in a lesson, enable your students to *explore* concepts, or *try* out new learning. Site elements include numbers, narratives, lists of references, still images, animations, video clips, sounds, and tools.

Network Elements are those capabilities of the web that facilitate communication with other individuals. In other words, these are the types of resources that connect people electronically to enable shared interactions. Network elements include e-mail, listservs, newsgroups, chat rooms, audio conferencing, and video conferencing.

Organized Sites are resources that are generally developed with a specific purpose in mind, such as to entertain, present current or historical events, provide background information, instruct, or encourage hands-on activities. They are a combination of site elements and many times will also contain network elements. These sites are generally used for their intended purpose to *frame* lessons within real and current events, *inform* learners about a topic, provide *exploratory* exercises, or provide opportunities to *try* out newly learned skills. Categories of organized sites include information, databanks, interactive events, current event, historical events, showcases, simulations, and tutorials.

APPENDIX: TEACHING AND LEARNING RESOURCES

Which resources do you use in the classroom?	Site Elements 18	Organized Sites 30	Network Elements 14
Textbooks, story books		X	
References materials such as dictionaries, encyclopedias, scientific journals		X	
Workbooks, worksheets, or handouts	X		
Data sets	X	X	
Graphs and charts	X		
Maps	X	X	
Pictures, Photographs	X		
Newspaper Articles		X	
Posters		X	
Newsletters, your own or others		X	X
Computer-based instruction		X	
Advertisements from magazines, newspapers, or television		X	
Videotapes or films	X	X	
Television		X	
Records, audio-tapes, CDs, or radio	X	X	
Manipulatives such as scientific instruments and models	X	X	
Video teleconferences			X
Audio teleconferences			X
Letters to students in other schools or regions			X
"Peer" teachers			X
Entertainment such as puzzles, games, music		X	
Guest speakers			X
Music or sounds	X		
Field trips		X	X

APPENDIX: INTERNET ACCESS

The Internet Access Worksheet on the facing page is provided to help you think about the location and extent of your current access to the Internet, and how it affects the strategies you could use to enhance your lessons with Web resources.

Instructions for completing the Internet Access Worksheet

1. Read the access configurations that are listed in the first column of the worksheet.

2. Use the following scale to indicate the extent of your access to the internet via the configurations specified in column 1:

> 0 = I do not have this type of access
>
> 1 = I occasionally have this type of access
>
> 2 = I always have this type of access

3. Score your access as 0, 1, or 2, based on the rating scale provided above.

4. Write the score in all of the open boxes in the row for each access configuration.

For example, if you occasionally have "Single . . . no projection " write "1" in the corresponding boxes in all three columns (see below). If you do not have "Single . . . with projector" write "0" in the corresponding boxes (see below). And, if you constantly have "Multiple computers…" write a "2" in the boxes in columns one and two (see below).

EXAMPLE:

Which configuration(s) of Internet access do you have for teaching and learning?	1st	2nd	3rd
Single (or few) computers connected to the Internet in *your* regular teaching classroom, no projection device available	1	1	1
Single (or few) computers connected to the Internet in *your* regular teaching classroom, with one connected to a projection device	0	0	
Multiple computers with connections to the Internet in your regular teaching classroom	2	2	

5. Repeat the process for all of the access configurations on the worksheet.

6. After responding to all of the items on the worksheet, add up the total for each column and write the total in the top box. There should be a total score for each of the three columns.

APPENDIX: INTERNET ACCESS

Which configuration(s) of Internet access do you have for teaching and learning?			
Single (or few) computers connected to the Internet in *your* regular teaching classroom, no projection device available: (1 – 2 computers with Internet access or a portable/ moveable computer with Internet access)			
Single (or few) computers connected to the Internet in *your* regular teaching classroom, with one connected to a projection device: (1 – 2 computers with Internet access or a portable/ moveable computer with Internet access)			
Multiple computers with connections to the Internet in your regular teaching classroom			
Computer lab with each computer connected to the Internet (at least 1 computer for every 2 students)			
One or more computers with Internet connection outside of the teaching classroom during school day (e.g. library, etc.)			
Internet connection only at home (or outside of school) for all students and teacher			
Internet connection at home (or outside of school) for teacher only			
Administrative Internet connection only (teachers only)			

APPENDIX: INTERNET ACCESS

Interpreting the worksheet

Compare your column scores with the scores of the categories of Web resources on the next page. If you scored 1 or higher in *any* of the columns, you *should* be able to use the web to enhance your lessons! The higher the score, the more options you have.

This worksheet should be interpreted by rows. Scores of 1 or 2 in rows 1, 2 or 3 will enable *you* to use the Web in your regular classroom to transmit information or interact with others from the Web to *frame* your lesson, or *inform* students.

Having only limited access as indicated by the configurations in rows 7 and 8, limits the role of the Web to that of *supporting* lessons with printed or downloaded site elements, organized sites, or printed network elements. While you won't be able to use the Web to transmit information or interact with others while in the classroom, you **can** use the information obtained to support lessons to *frame*, and *inform*.

Multiple points of access as noted by your scores of 1 or 2 in rows 3, 4, 5, and 6 enables all of the above capabilities plus enables your *students* to *explore* information that is on the Net or *explore* by interacting with others. Students can also *try* out newly acquired skills by getting feedback from others on the Net.

After completing this section of the handbook, you should review the WELES keeping in mind the type of strategies you can use with the type of access you actually have.

A brief description of how the transmission of, and thereby access to, each type of Web Resource can enhance lessons using Web Enhanced Learning Environment Strategies (WELES) follows:

Sites (access to information) enhance lessons by carrying information from the Web directly *to* the learner. This transmission is one-way. Information from Web resources (site elements or organized sites), are used by the teacher to *frame* lessons, or *inform* students, or by the student to *explore* content or *try* out newly learned skills, knowledge or inclinations.

Networks (access to people) enhance lessons by connecting people (others) from the Web *with* the learner and *vice versa*. This interaction is two-way. The teacher uses other people accessible via Web network elements or organized sites to help *frame* lessons, *inform* students, give feedback on student *tryouts*, or to connect a group together to *explore* ideas or problems.

Support (limited access to people and networks) enhances lessons by carrying information from the Web *indirectly* to the learner. There is no direct transmission to the learner. Information from Web resources (site elements, organized sites or network elements) is downloaded or printed to enhance lessons taught at a later time. This information can be used by the teacher to frame lessons, or inform learners.

APPENDIX: INTERNET ACCESS

Which configuration(s) of Internet access do you have for teaching and learning?	Site (information) 12	Network (people) 12	Support 10
Single (or few) computers connected to the Internet in *your* regular teaching classroom, no projection device available: (1 – 2 computers with Internet access or a portable/ moveable computer with Internet access)	L[1]	L[1]	X
Single (or few) computers connected to the Internet in *your* regular teaching classroom, with one connected to a projection device: (1 – 2 computers with Internet access or a portable/ moveable computer with Internet access)	X	L[1]	
Multiple computers with connections to the Internet in your regular teaching classroom	X	X	
Computer lab with each computer connected to the Internet (at least 1 computer for every 2 students)	X	X	
One or more computers with Internet connection outside of the teaching classroom during school day (e.g. library, etc.)	L[1]	L[1]	X
Internet connection only at home (or outside of school) for all students and teacher	X	X	X
Internet connection at home (or outside of school) for teacher only			X
Administrative Internet connection only (teachers only)			X

*Notes:

1. Use with this would be limited.

APPENDIX: LESSON STRATEGIES

The Lesson Strategy Worksheet on the facing page is provided for you to consider which lesson strategies you currently use to teach.

Instructions for completing the Lesson Strategies Worksheet

1. Read the descriptions of the lesson strategies presented in the first column of the worksheet.

2. Use the following scale to rate the likelihood of your using those strategies.

> 0 = I do not use this strategy
>
> 1 = I occasionally use this strategy
>
> 2 = I often use this strategy

3. Score each strategy as 0, 1, or 2, based on the rating scale provided above.

4. Write the score in all of the open boxes in the row for each strategy.

For example, if you do not "*Demonstrate* new ideas and concepts to students" write "0" in the corresponding boxes in columns one and two (see below). If you occasionally "Provide students with opportunities to *review* new information" write "1" in the boxes in column two and three (see below). And, if you often "Provide students with opportunities to *question* new information" write a "2" in all four of the corresponding boxes (see below).

EXAMPLE:

Which lesson strategies do you use?	1st	2nd	3rd	4th
Demonstrate new ideas and concepts to students.	**0**	**0**		
Provide students with an opportunity to *review* new information.		**1**	**1**	
Provide students with opportunities to *question* new information.	**2**	**2**	**2**	**2**

5. Repeat the process for all of the lesson strategies on the worksheet.

6. After responding to all of the items on the worksheet, add up the total for each column and write the total in the top box. There should be a total score for each of the four columns.

APPENDIX: LESSON STRATEGIES

Which lesson strategies do you use?				
Set the *mood* for a lesson.				
Use motivational activities to promote *interest* in subject.				
Use motivational activities to set *context* for lesson.				
Encourage *student discussion* to introduce a new subject area.				
Present new information to students.				
Demonstrate new ideas and concepts to students.				
Provide students with an opportunity to *review* new information.				
Provide students with opportunities to *question* new information.				
Provide students with opportunities to *investigate* and *research* new information.				
Provide students with opportunities to *practice* their new knowledge in class.				
Provide students with out-of-class assignments to *try out* new knowledge.				
Test students' knowledge of new subject area.				

APPENDIX: LESSON STRATEGIES

Interpreting the worksheet

Compare your column scores with the scores for each of lesson strategies on the next page. The higher the numeric score, the more likely you use these strategies in your teaching. These lesson strategies merge methods of teaching with Web Resources to create Web-Enhanced Learning Environment Strategies, or WELES!

Each of the merged lesson strategies (WELES) is described below.

Frame is a lesson strategy in which a context for studying a particular topic is established. Setting context for learning may include providing directions or creating a mood. Framing often occurs in the introductory and motivational activities to promote interest in subject areas or provide a context for approaching learning. Problems are often set in real or fantasy events that are easily accessible from the web. Framing is an important motivational strategy for all six methods of teaching, regardless of whether the teacher, the learner, or their partnership controls the lesson. Web resources take students to new settings, provide multiple views on specific events or issues, or expose students to curious situations that can frame all learning events.

Inform is the lesson strategy in which information about the content is conveyed to the learner during a presentation, demonstration, or discussion--that is--those activities that are representative of the present and guide teaching methods. Informing implies a directive role taken by the teacher or information. The Web is rich with site elements, organized sites and people from the network elements that can be used to provide this content.

Explore is the lesson strategy that is student directed. Students investigate, manipulate, and research subject areas, problems and situations, those activities represented in the guide, active learning, collaboration, problem based and role playing teaching methods. Again, the Web is rich with information from site elements and organized sites that form the basis for this exploration. The Web is also rich with people through network elements and organized sites to function as exploration partners.

Try is the lesson strategy in which the student practices, or tests their newly acquired knowledge, skills or inclinations as represented in the guide, active learning, problem-based, and role playing methods of teaching. Teachers must be more selective of the type of sites that are selected to enable students to try out new learning. Sites in this case must be interactive in some way, either through interactive networked individuals or interactive sites. Students need to take an active role with the Web resources.

APPENDIX: LESSON STRATEGIES

Which lesson strategies do you use?	Frame 14	Inform 10	Explore 6	Try 8
Set the mood for a lesson.	X			
Use motivational activities to promote interest in subject.	X			
Use motivational activities to set context for lesson.	X			
Encourage student discussion to introduce a new subject area.	X	X		
Present new information to students.	X	X		
Demonstrate new ideas and concepts to students.	X	X		
Provide students with an opportunity to review new information.		X	X	
Provide students with opportunities to question new information.	X	X	X	X
Provide students with opportunities to investigate and research new information.			X	
Provide students with opportunities to practice their new knowledge in class.				X
Provide students with out-of-class assignments to try out new knowledge.				X
Test students' knowledge of new subject area.				X

APPENDICIES

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