Flight Plans for Learning:

Differentiation & Deep Thinking through Technology

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Reading, Tech, & Differentiation

Differentiation involves adapting instruction to respond to the diverse needs of learners. Let's explore three ways to think about reading, technology, and differentiation:

Reading Practice

What's practice? Boring worksheets and old-fashioned drill and practice software has given practice a bad name. Practice is an essential part of learning. For instance, I want an airplane pilot who has had lots of practice flying a plane. Research shows that the more you read and write, the better you get. Practice is more than simple drills. It's applying what you've learned to new situations. Use technology to identify practice environments to address the diverse needs of your students.

Experiment!
Explore the websites and online lessons. How can online materials help address the diverse needs in your classroom? Discuss issues related to age appropriateness. What make these materials effective or ineffective?

Although some students quickly acquire reading strategies, others need specific instruction related to reading concepts. Explore websites that provide practice in reading.

Reading Tools

Some students need more guidance than others when reading. The support may be reading activities, anticipation guides, or other supplemental materials. Sometimes the use of visuals, audio, and other channels of communication are helpful. Consider the use of tools such as *Inspiration* to help students visualize the plot, characters, and setting of a reading material.

Real-world Reading

Explore age-appropriate readings that reflect activities beyond the school. Seek topics of interest to individual students. In particular, boys are attracted to ezines and news sources.

Experiment!
Design an activity based on an article. Consider the individual differences in your class. How can focused practice, using reading tools, and integrating real-world reading assignments help particular students in your class? Rethink how your classroom computers are being used. Do all students complete the same activities? How are your computers an opportunity to differentiate to meet the needs of individual children?

http://eduscapes.com/sessions/pilot/pilotread.htm

Writing, Technology, and Differentiation

When you design writing experiences, are you considering the diverse needs of your students? Some students write well with paper and pencil, while others excel at using the keyboard. Some students need prompts while others prefer to be more creative. Outlines, mind maps, and oral brainstorming are different ways that students might plan for writing. Are you providing a variety of tools? Seek technology solutions to differentiate. Let's explore three ways to think about writing, technology, and differentiation.

Writing Practice and Tools

Many online resources are available to stimulate writing ideas and practice writing skills. Seek out those that reinforce essential skills and expand thinking.

Let's say you want to practice sequencing or writing directions. Ask students to complete a virtual activity. Then write the steps they followed. Younger students could recreate the experience with sequencing cards or real objects while older students might write paragraphs.

Let's say you're looking for some quick extension activities that won't take much time. Use photos or short examples as starters.

Writing Tools

Online tools are particularly useful for students who have trouble getting started with a blank piece of paper. They provide scenarios, prompts, ideas, and other tools to guide the writing process.

As you explore online tools, consider what standards they will help you address. Also think about specific children in your classroom that might benefit from particular tools.

Authentic Audiences

Design learning experiences that promote writing with a purpose.

- Identify a real need, authentic audience, and reach beyond the classroom.
- Use technology communication tools such as email, blogs, and websites.

How could you get your students involved in class writing projects using a blog?
How could you connect with a member of the local, national, or international community?
What could your class create to share with the world?
Could you create your own website related to a theme?
How could you share the work of your children?

Experiment!
Brainstorm ways to make connections with parents, the community, and children around the world through authentic writing activities. What's realistic? What tools do you have to produce web pages? Try Kidspiration!

http://eduscapes.com/sessions/pilot/pilotwrite.htm

Math, Technology, and Differentiation

When you think of an airplane, you may get a particular image in your mind. However there are many different kinds of airplanes. Since the introduction of Math Blasters over 20 years ago, many teachers still associate the computer with drill and practice. However there are many ways to use technology in mathematics instruction. The key is flexible thinking. Each child learns differently. Some will be successful with manipulatives, while others find computer tools, photographs, or real-world data engaging. Let's explore three ways to think about math and technology.

Math Practice

With endless patience and unlimited examples, the computer is a great tool to help students practice math concepts. The key is matching the needs of learners with meaningful resources.

Experiment!
Compare web-based activities from two different developers above. How do they compare? Compare online math practice with off-computer practice. Select one website and brainstorm classroom management issues.

Math Tools

From pebbles to the abacus, people throughout history have used tools to help with calculation. Today, many tools are available for students to help them manipulate and visualize math concepts. Provide different tools to address individual ways of thinking about calculation and mathematical representations.

Experiment!
Explore online tools that help students work with math concepts. What off-computer activities are needed to guide the use of this tool? Will you print sample screens? Will you provide problems to solve? How will these tools be introduced in a large-group settings? How will individual students access the tools? Pick one tool to explore in-depth. Design a Word-based activity to will get students started using this tool. Brainstorm sample problems.

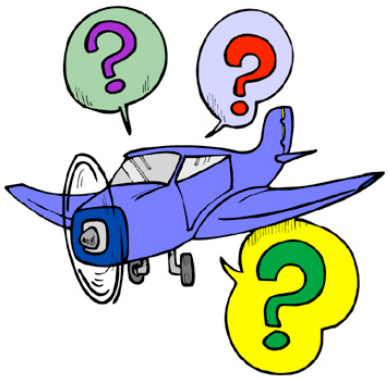
Real-world Data & Creative Math

Combine real objects and manipulatives with computers and digital cameras. Some students see math as endless strings of numbers. Help them see the relevance of math in everyday life. Ask students to create their own story problems and authentic math situations. Use the resources below to get started thinking about creative math problems.

Experiment!
Design an activity that involves students writing their own math problems and using digital cameras to visualize math.

http://eduscapes.com/sessions/pilot/pilotmath.htm

Inferential Thinking Across the Curriculum



Questioning to Facilitate Inferential Thinking

First, determine whether the answer is clear or whether it will need to be inferred. Then, ask yourself the following questions:

- What do I already know about this topic? What do I need to know?
- What does it say, what does it mean?
- What information (evidence) is available?
- What do we know about the people, places, situations, and objects?
- What information is most important?
- Why is some information more important than other information?
- How does one piece of information impact other information?
- How is new information connected to background experiences and knowledge?
- How does categorizing, comparing, or sequencing information influence understanding?
- How can information be weighed to determine the best solution? What are the best clues?
- What linkages can be identified? What additional questions arise?

Experiment!

Apply these questions to the needs of children at your grade level. What scaffolding do they need to ask good questions as they use online resources? What tools such as online resources, Word and Kidspiration can be used to organize information and ideas?

Making Inferences from Online Resources

Model Inference. Start by sharing short online web pages such as news articles and highlighting the clues that help students make inferences.

- Take a "picture walk" through the website.
- Use the "think-aloud" technique.
- Highlight examples of “reading between the lines”
- Ask yourself: What am I **thinking**? What is the **evidence**?

Provide Guidance. Use guiding questions to encourage students to make inferences from multiple page websites. Move though a website or series of screens as a large group. Direct student attention through questioning.

Identify Common Errors. Help students identify common mistakes in website use. At the same time discuss the importance of knowing the origin of the information, perspective of the website, and authority of the author.

Social Studies & Inferential Thinking

When working with students, use the example of being a detective and solving a mystery. The detective must weigh all the evidence before making a decision. Think about what happens after a plane disaster. Investigators examine the black box recorder, pieces of the plane, survivor interviews, witness accounts, and any other forms of information they can find.

Use Logic. See if you can figure out the answer by looking at all the available information. If it's a word, see if you can figure out the meaning from the context of the sentence. If it's the answer to a math problem, see if the information needed to solve the problem can be found in the story problem or data set. If it's a problem related to history or science, look at all the related events.

Analyze Examples. Look for examples that might provide an explanation. What describes this situation? What information relates to this problem? What are the place, places, and things that might help me understand the situation? What experiences have I had that are similar to this situation?

Examine All Information Forms. Look beyond the text. Consider audio, data, photographs, and other ways to represent ideas. Consider facial expressions, the tone of a voice, and other elements that might be found in multimedia information sources. Also, look for real objects and settings. Consider context.

Visualize Thinking. Create a chart or diagram that helps you see different perspectives, points of view, options, or different ways of thinking about the topic. If it's the meaning of a word, look for synonyms with similar meaning or antonyms with opposite meaning to infer meaning. Create a Venn diagram or other chart to compare and contrast ideas. Consider logic charts, KWL charts, and other ways of organizing ideas and information to visualize thinking.

Remain Skeptical. Become a devil's advocate. Look at all perspectives. Consider why information might be incorrect or untrue.

Science & Inferential Thinking

Scientists make inferences based on observations. They make hypotheses, collect data, interpret data, and draw conclusions. In some cases scientists can't make direct observations, instead they have to make predictions based on the evidence. For example, we can't visit the core of the earth, but we can still make predictions about volcanoes and earthquakes.

Interpolating and extrapolating are elements of predictions. When scientists interpolate, they observe, then make predictions within the range of the current data. When scientists extrapolate, they use analyze available information, then make predictions outside of the range of current data. Inferences aren't answers, they're educated guesses based on evidence.

Experiment!
Select an interactive website. Identify a specific standard that can be addressed using this website. Design a series of questions, instructions, or activities that promote inferential thinking related to the content.

http://eduscapes.com/sessions/pilot/pilotinference.htm

Virtual Experiences: Field Trips & Simulations

We'd love to take our children on a trip to the great art and science museums of the world, explore the ocean bottom, or visit the earth's core. Whether it's the cost of a bus trip or the danger of a trip into outer space, sometimes a virtual field trip or simulation is more realistic.

Field Trips

Turn a simple website into a virtual field trip by designing engaging off computer activities including tickets, maps, and travel itineraries. Many virtual fieldtrips are produced by professionals; however also explore virtual field trips made by kids, for kids.

Experiment!
Build a virtual field trip. First, explore photos for ideas. Second, use one of the templates to create the experience. Third, record narration. Fourth, design an activity where students would be involved in creating their own.

Simulations

Simulations help students apply their skills to "real life" situations by providing an environment to manipulate variables, examine relationships, and make decisions. They are generally used after initial instruction as part of application, review, or remediation.

There are many types of simulations. **Physical** simulations involve students in using objects or machines such as microscopes or airplanes. **Procedural** simulations involve a series of actions or steps such as medical diagnosis or frog dissection. **Situational** simulations involve critical incidents within particular settings such as interactions with customers. **Process** simulations involve decision-making skills related to topics such as economics, genetics, or geology. Students must choose among alternative paths.

Experiment!
Explore simulations. Discuss how you would build a classroom environment to immerse students in the simulation. What books, activities, and objects could be used to build into the learning environment?

Tools for Virtual Experiences

Live video cams, expert discussions, maps, and photographs can all help bring the outside world alive. Take a trip with videos or photos with sound. Or, try Google Earth or Local.

Experiment!
Design an activity that incorporates a live webcam, Google Earth, Google Local.

http://eduscapes.com/sessions/pilot/pilotvirtual.htm