Sublime Learning

Transformational Teaching with Technology

eTeachables: Supporting Transformational Practices in Classroom Instruction

Research Paper

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eTeachables:
Supporting Transformational Practices in Classroom Instruction

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THE SITUATION:

Teachers Struggle to Integrate Technology Into Instruction

In 2010, the Department of Education's Office of Educational Technology released The National Education Technology Plan 2010 (NETP), *Transforming American Education: Learning Powered by Technology*. The plan recognizes "...that technology is at the core of virtually every aspect of our daily lives and work, and we must leverage it to provide engaging and powerful learning experiences and content..." Technology can no longer be considered a "peripheral" (NETP, 2010) and teachers must take the lead to ensure technology improves student learning.

> **"…we must leverage it (technology) to provide engaging and powerful learning experiences and content."**
>
> National Technology Plan, 2010

Educators face the challenge of teaching in a digital world

We live in a digital world that requires a new set of skills for both students and teachers. Students need to plan, collaborate, create and share within digital environments. Teachers need to incorporate technology purposefully into their instruction to prepare students to successfully live and work in the 21st century.

Key 21st Century Skills
(Partnership for 21st Century Skills, the ISTE NETS & 21st Century Fluency Project)

The New Media Consortium Horizon Report from 2011 describes the following as one of five key trends for the next five years:

"Technology continues to profoundly affect the way we work, collaborate, communicate, and succeed. Increasingly, technology skills are also critical to success in almost every arena, and those who are more facile with technology will advance while those without access or skills will not. The digital divide, once seen as a factor of wealth, is now seen as a factor of education: those who have the opportunity to learn technology skills are in a better position to obtain and make use of technology than those who do not. Evolving occupations, multiple careers, and an increasingly mobile workforce contribute to this trend." (Johnson, Adams, & Haywood, 2011)

Few learning opportunities exist to integrate technology into classroom instruction

Teachers are often asked to absorb and integrate classroom-changing practices, such as adding technology into instruction after receiving only a few hours of professional development. But " . . . teachers typically need substantial professional development in a given area (close to 50 hours) to improve their skills and their students' learning..." (Darling-Hammond, Chung Wei, Andree, Richardson & Orphanos, 2009) Statistics from 2009 show that 13 percent of teachers received no professional development for educational technology, and another 53 percent had received only 1 to 8 hours in the previous year. (Gray, Thomas, & Lewis, 2010)

To embed new practices in their classrooms, teachers, like students, need multiple opportunities over time to learn and then apply what they learn.

The vast majority of technology training focuses on "where to click" in the software. Teachers may learn how to use the basic features of the technology but rarely gain an understanding of how it can be used to improve student learning.

Education researchers are raising awareness of this shortcoming.

"There are few courses and professional development training opportunities to help teachers...learn how to use technology to meet curriculum outcomes. Training tends to focus on how to use a particular piece of software or hardware so teachers are largely on their own when it comes to figuring out how to use technology to support and enhance learning." (Steeves, 2012)

Educators have limited access to models, examples and resources that support effective teaching strategies

The challenge? Overcome the tendency to use technology to replicate current classroom practice—merely replacing the pen with a word processor or the Internet for a textbook—and instead use technology to transform the thinking and learning that happens in the classroom. Teachers need well-conceived materials, grounded in research, to help them explore how their teaching needs to change.

Without on-going support for teachers to change their practice, there is little evidence that rapid developments in technology, such as Interactive Whiteboards, Web 2.0 applications, tablets, iPads, and other wireless devices, will be successfully integrated into instruction and used to improve student learning. In fact, these technologies will in all likelihood meet the same fate as earlier generations of underused or forgotten technologies. (Greaves, Hayes, Wilson, Gielniak, & Peterson, 2010)

THE SUBLIME LEARNING SOLUTION

Overview

If teachers need to change their teaching practices to meet the demands of the 21st century, and if technology is to be the catalyst for this change, then professional development using technology must change as well. This includes the type, duration, focus, and intent of professional development. Further, technology tools, when embedded in research-driven instruction, sound pedagogy, and differentiated teaching, have the power to transform learning and learners. Improved teacher understanding and learning translates into improved student understanding and learning.

With this in mind, Sublime Learning created eTeachables.

eTeachables address standards-based subjects under four broad learning categories: thinking skills, reading comprehension, writing frameworks and math skills. Each eTeachable includes:
a 3 to 8 minute video tutorial, a Professional Learning Guide, and one or more customizable templates.

The Design Approach to eTeachable Libraries

eTeachables are grouped into libraries that center on a particular technology. These libraries are found through a searchable learning portal and give instant access to resources and models for professional learning. Currently there are four libraries; Interactive Whiteboards (SMART™), Interactive Whiteboards (Promethean), Visual Learning (Inspiration® and Kidspiration®) and Assistive Technology (Kurzweil 3000™), with several new libraries in production for on-line applications and handheld devices.

Regardless of the library, eTeachables follow a deliberate design approach, carefully crafted to ensure a balance among technology, pedagogy and content.

eTeachable: Access Professional Learning Guide, Video and Template

The Components: Professional Learning Guide, Video, and Templates

Professional Learning Guide

Each eTeachable includes a downloadable Learning Guide to support professional growth through reflective practice. The guide leads teachers through a four-step process: Inquire, Plan, Act and Reflect. During this process the teacher:

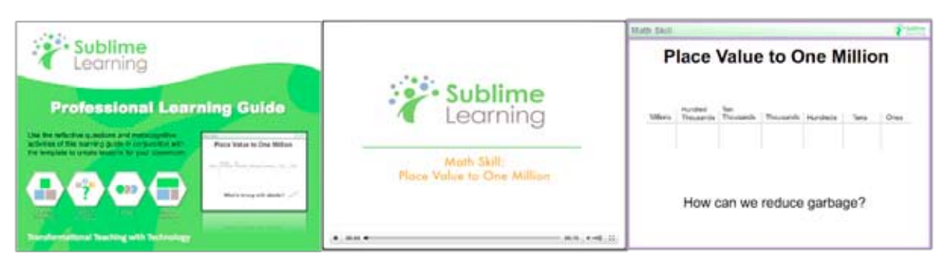
- Examines observational, test and research data
- Explores technological and instructional readiness levels
- Sets SMART goals for professional learning
- Views and responds to eTeachables using Bloom's Taxonomy
- Designs and teaches a lesson
- Reflects on their lesson: what worked, what could they improve

Video Tutorial

- **Incorporates Research-based Teaching Strategies**
  Each video keeps the focus on how technology supports and enhances learning. Each is based on teaching strategies rooted in sound pedagogy and research
- **Emphasizes 21st Century Skills**
  Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001) with higher order thinking skills emphasized—analyzing, evaluating, and creating—is integral to each eTeachable video. Essential questions, collaborative approaches to learning, and meaningful culminating tasks help ensure that technology is used to build and support important 21st century skills.
- **Meets the Needs of All Learners**
  - **Universal Design for Learning (UDL)** Each video applies UDL guiding principles, with a focus on "multiple means." Videos move away from a "one size fits all" approach to teaching and learning.
  - **Differentiated Instruction** Specific differentiated instruction activities help teachers build up a repertoire of strategies, both pedagogical and technological, to support the variety of learners in their classroom.
- **Makes Cross-Curricular Connections**
  eTeachables are not lesson plans but powerful models for professional development with application across subjects and grade levels.

Templates

Each eTeachable includes one or more customizable templates. Whereas the video explores theory, the template supports application and practice. Teachers can easily download a copy of the blank template.



Professional Learning Guide | Video | Template

RESEARCH DEFINED

With eTeachables, teachers understand and practice the effective use of technology to improve student learning. To create eTeachables—in structure, design, and use—Sublime Learning researched evidence-based practices and expert knowledge in three important areas: **Job-Embedded Professional Learning, Intersection of Technology, Pedagogy and Content (TPACK), and Pedagogical Practices For The 21st Century Classroom.**

JOB-EMBEDDED PROFESSIONAL LEARNING

Research and Expert Opinion

Research shows that teachers need on-going access to tools, resources, and guidance as they learn and apply their new awareness and practices, which in turn positively impacts student outcomes.

"We see professional learning as being the investigative processes that educators willingly engage in to solve authentic problems by changing their practices . . .Professional Learning is not something that occurs in a series of events, however loosely or tightly connected, in a setting outside of the normal workplace and workday. Professional learning is an ongoing, integral part of the work of educators in which they participate . . ." (Hannay, Wideman & Seller, 2006)

The latest research findings emphasize that to improve teaching practice, effective professional development needs to be:

Ongoing and Cyclical

- The report Reviewing the evidence on how teacher professional development affects student achievement, states that teachers who receive substantial professional development (on average 49 hours in the 9 studies reviewed) increased their student's' achievement by 21 percentile points. (Yoon, Duncan, Lee, Scarloss, & Shapley, 2007)
- "When carefully designed and energetically supported, ambitious PD focused on instructional content and materials and sustained over time can change what happens in classrooms; impacts on teachers and their teaching were typically evident after approximately 30 hours of PD. . . ." (Weiss, & Pasley, 2006)

Connected to Daily Practices

- Teachers need to apply what they learn in professional development sessions directly to the classroom. By making the connection among their professional (theory-based) learning, practical classroom application and positive student outcomes, teachers are more likely to make long-term changes to their instructional practice. (Timperley, Wilson, Barrar & Fung, 2007)
- "…if PD is to move beyond business as usual, it must be based on content and practice and planned as a coherent set of strategies to develop teachers' content and pedagogical knowledge." (Weiss, & Pasley, 2006).

Flexible, Just-in-Time

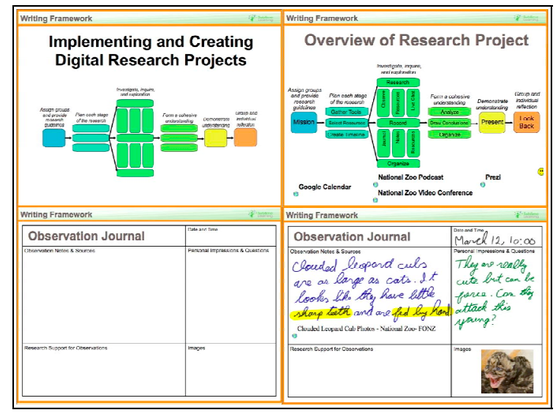
- "Granger et al. (2002) found that 'just-in-time' professional development is the most influential factor contributing to teachers' integration of technology into their class- rooms. 'Just-in-time' professional development, rather than 'just-in-case' development (Schrum, 1999) may gain more teacher acceptance because it addresses the teachers' immediate concerns and is thus consistent with teachers' needs." (Hew and Brush, 2006)

JOB-EMBEDDED PROFESSIONAL LEARNING

eTeachable Connection

eTeachables support the continuous cycle of professional learning

- The Professional Learning Guide supports the cycle of professional learning by encouraging teachers to examine and change their practice. For example, after viewing an eTeachable, and before delivering a lesson, a teacher can explore related activities based on Bloom's Revised Taxonomy. This helps a teacher think about the "why" rather than the "how to," moving the use of eTeachables beyond replication of a lesson.
- The web-based eTeachable libraries contain hundreds of videos, providing continuous access to information, models, and resources needed for ongoing professional practice.
- When used in conjunction with current district models of professional development, eTeachables help extend and enhance teacher learning—and increase the number of instructional hours needed to effectively change their teaching approach.



- The downloadable template allows the teacher to apply new learning to the classroom setting by adapting the template to meet student needs.

eTeachables are immediately applicable to classroom practice

- eTeachables are designed for a variety of classroom settings and support collaboration among teachers of various grade levels and subjects. Cross-curricular connections within the videos spark ideas, help scaffold the use of strategies to other curriculum areas, and build technology skills across content areas.
- Every eTeachable video highlights instructional strategies and technology features, explicitly describing how to differentiate instruction to support a variety of learners.
- The Professional Learning Guide includes reflective questions and metacognitive activities in a downloadable format to stimulate discussion and action on practice.
- Teachers can use the templates to replicate the lesson, develop a similar lesson for another grade level or content area, or alter it to meet student needs.

eTeachables provide access to resources at a convenient time and place.

- eTeachables are available on demand through a web-based learning portal. Teachers can re-watch the video as needed, share the eTeachable with colleagues, and immediately download the related template to design and implement their lessons.
- The portal is highly searchable by a set of useful categories including: technology, learning category, teaching strategy, differentiated population, as well as grade and subject.

INTERSECTION OF TECHNOLOGY, PEDAGOGY AND CONTENT

Research and Expert Opinion

Professional Development offerings with titles such as "PowerPoint ® Part One" or "Cool Apps for iPads ®" show how pedagogy and technology are often disconnected. These sessions typically focus almost exclusively on "tech tips", "great resources" and "where to click". This technology-focused approach, practiced for decades, has not provided the depth of understanding needed to change classroom practice and effect student outcomes. (Timperley, Wilson, Barrar & Fung, 2007)

- "To effectively infuse technology into the curriculum, teachers need to participate in intensive curriculum-based technology training that move them beyond the attainment of basic computer skills to activities that teach them how to seamlessly integrate technology into the curriculum." (Baylor & Ritchie, 2002; Becker, 2001; Redish, 1997; Reynolds & Morgan, 2001; Roberts, 2003; VanFossen, 2001; Wenglinsky, 1998 as cited in Zhao and Bryant, 2006)

- Technology can be a powerful catalyst for change; however, "Technology, alone, cannot drive reform. If technology is brought into classrooms without revisiting the curricular and pedagogical issues, it risks being used to implement the educational strategies of the past." (Jacobsen, Saar & Friesen, 2007)

- TPACK, the integration of **technology, pedagogy** and **content** knowledge, when applied to technology related professional development, helps keep the focus on teaching and learning. TPACK is especially important as it offers a form of thinking about technology beyond mere technology functions and functionality. It encourages technology to become a catalyst for change, strengthened by content knowledge, and empowered by good pedagogy.

- In order to go beyond the simple 'skills instruction' view offered by the traditional workshop approach, we have argued that it is necessary to teach technology in contexts that honor the rich connections between technology, the subject matter Content (content), and the means of teaching it (the pedagogy)" (Koehler, 2011)

INTERSECTION OF TECHNOLOGY, PEDAGOGY AND CONTENT

eTeachable Connection

eTeachables move the focus away from the functions and features and toward sound instructional practices supported and enhanced through technology.

The Professional Learning Guides encourage teachers to:

- question their teaching practice as they explore technology's impact on learning
- modify the downloadable template to support their curriculum focus
- alter their teaching rather than merely replicate the lesson they view in the video

As teachers view the eTeachable video, they experience real-world examples of TPACK. They see how features of the technology tool are used in conjunction with sound pedagogy.

Integration of Technology, Pedagogy and Content

Teachers use the downloadable template as they build a lesson. Not only do they include the knowledge and skills from the curriculum, they also consider how instructional strategies and features of technology support learning objectives.

Every eTeachable has an associated template for immediate use.

PEDAGOGICAL PRACTICES FOR THE 21ST CENTURY CLASSROOM

Research and Expert Opinion: Inquiry-based Learning

With eTeachables, teachers understand and practice the effective use of technology to improve student Pedagogy often defined as the art and science of teaching based on instructional methods and strategies, continues to evolve. It is now generally accepted that "[t]o prepare students to learn throughout their lives and in settings beyond classrooms, we must change what and how we teach to match what people need to know, how they learn, and where and when they learn." (NETP, 2010)

Research supports the use of the following instructional theories and practices as being integral to the creation of a 21st century learning environment.

- **Inquiry-Based Learning**
- **Higher Order Thinking Skills**
- **Research-based Instructional Strategies**
- **Visual Learning Techniques** (including Graphic Organizers)
- **Universal Design for Learning**
- **Differentiated Instruction**

Inquiry-Based Learning

For learners to move from memorizing content to creating knowledge, teachers must plan and implement classroom instruction that includes inquiry-based activities and higher order thinking—and they need the support and materials to do so. Memorization, rote learning and lower order thinking will not build the skills students need to live and work in the 21st century.

- "Learning research has shown that students learn best by actively 'constructing' knowledge from a combination of experience, interpretation, and structured interactions with peers and teachers. When students are placed in the relatively passive role of receiving information from lectures and texts (the 'transmission' model of learning), they often fail to develop sufficient understanding to be able to apply what they have learned to situations outside their texts and classrooms." (Bransford, Brown & Cocking, 1999; Greeno, Collins & Resnick, 1996; Bransford & Schwartz, 1999 cited in Roschelle, Pea, Hoadley, Gordin, & Means 2001)

- Using technology for drill and practice is ineffective, producing no significant effects on student learning in reading and math. On the other hand, constructivist use of computers for writing, research, collaboration, analysis, and publication showed positive test score effects. (Warschauer & Matuchniak, 2010)

PEDAGOGICAL PRACTICES FOR THE 21ST CENTURY CLASSROOM

eTeachable Connection: Inquiry-based Learning

The eTeachable library for Interactive Whiteboards supports inquiry-based learning. Each eTeachable explores a question, idea, concept, or skill incorporating both structured tasks, taught by direct instruction, and open-ended tasks involving experiential learning. Teachers view models of inquiry-based learning that include questioning, compare and contrast, exploration, analysis, and cooperative learning techniques. To further build teachers' understanding of inquiry-based learning, many eTeachables in the IWB library are also part of an Essential Question series.

Titles include:

- **Communication**: Do I need more than words to communicate?
- **Habitats**: How do biomes maintain their balance?
- **The Environment**: Is there such a thing as "away"?

Within each Essential Question is a separate video/template and four related eTeachables. The introductory video has two sections. The first section explains how the four videos in the series fit together. The second section includes sound instructional practices to introduce the essential question to students. The four related eTeachables connect to the four main learning categories.

For example, under the essential question "How do we determine how we spend money?" the associated eTeachables are:

- **Math Skills**: Graphic Algebraic Equations to Calculate Interest Rates
- **Reading Strategies**: Comprehending Text with Guiding Questions
- **Writing Frameworks**: Research Writing with Flexible Groupings
- **Thinking Skills**: Developing Background with Advance Organizers

eTeachable Essential Questions

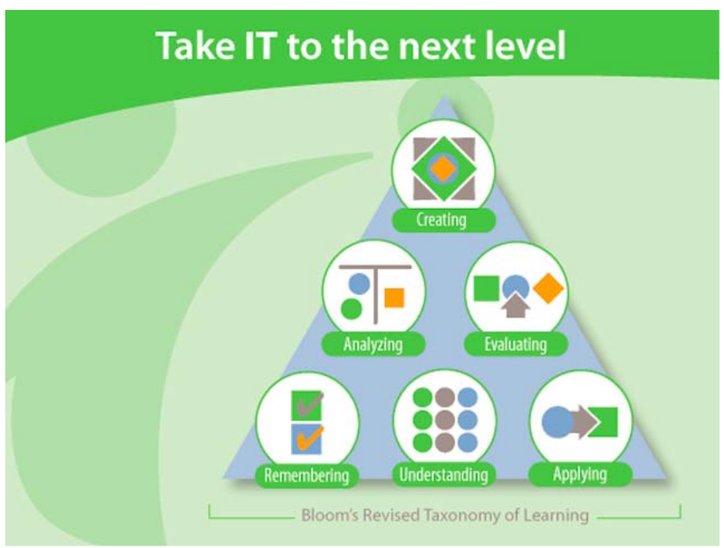
PEDAGOGICAL PRACTICES FOR THE 21ST CENTURY CLASSROOM

Research and Expert Opinion: Higher Order Thinking Skills

Since the 1950s, educators have used Bloom's original taxonomy (1956) and Anderson's revised taxonomy (2001) to guide planning and implementation. The taxonomy represents a "multi-tiered model of classifying thinking according to six cognitive levels of complexity," (Orey, 2001) from lower order (remembering, understanding, and applying) to higher order (analyzing, evaluating, and creating). Although each level of the taxonomy is important, students need the higher order thinking skills to solve problems, make decisions, and design solutions.

- "Higher-level questions that ask students to analyze information results in more learning than simply asking students to recall information (from Redfield and Rousseau, 1981, qtd. in Northwest Regional Educational Laboratory, 2005). However, teachers are more apt to ask lower-order questions." (Fillippone, 1998; Mueller, 1973, qtd. in Northwest Regional Educational Laboratory, 2005)

- In 2009 the National Center for Education Statistics' reported that 97 percent of teachers had access to computers, 74 percent used them for instruction; only 45 percent of students used technology to solve problems, 25 percent to create art, music, movies or webcasts or design, and 13 percent to create products. (Gray, Thomas & Lewis, 2009)



Bloom's Revised Taxonomy of Learning

PEDAGOGICAL PRACTICES FOR THE 21ST CENTURY CLASSROOM

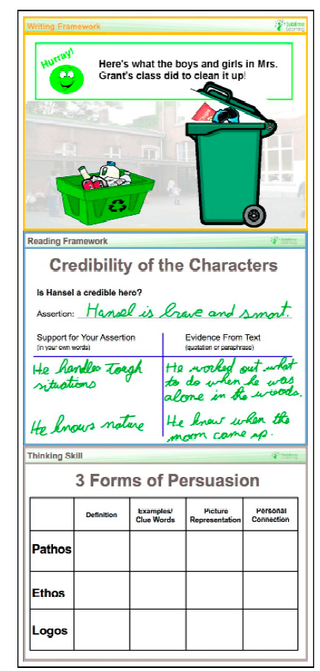
eTeachable Connection: Higher Order Thinking Skills

In the Visual Learning Library, each eTeachable explores the use of a graphic organizer that supports higher-level thinking and learning. For example:

- **Charts** are used to analyze characteristics and make decisions.
- The **Frayer Model** explores the understanding of concepts through examples and non-examples.
- **Concept maps, webs, semantic maps and thinking maps**, use color, shapes, links, and images to explore relationships between and among ideas.
- **Writing frameworks** examine the structure and organization of writing, using shapes, color, and sequence

In the Interactive Whiteboard library, each eTeachable video begins with a reference to Bloom's revised taxonomy, highlighting its importance and encouraging teachers to reflect on the application of the various levels throughout the video.

In most videos within the series, many levels of the taxonomy are addressed with an emphasis on the higher levels, such as analyzing, evaluating and creating.



Examples:

Predictable Writing Patterns—Teachers explore how to work with primary students to design and create books that share students' ideas and understanding related to the concept "away," as it relates to garbage removal.

Analyze Characters with Learning Logs—Teachers view a lesson, which includes analysis and reflection, to determine how characters in literature show courage.

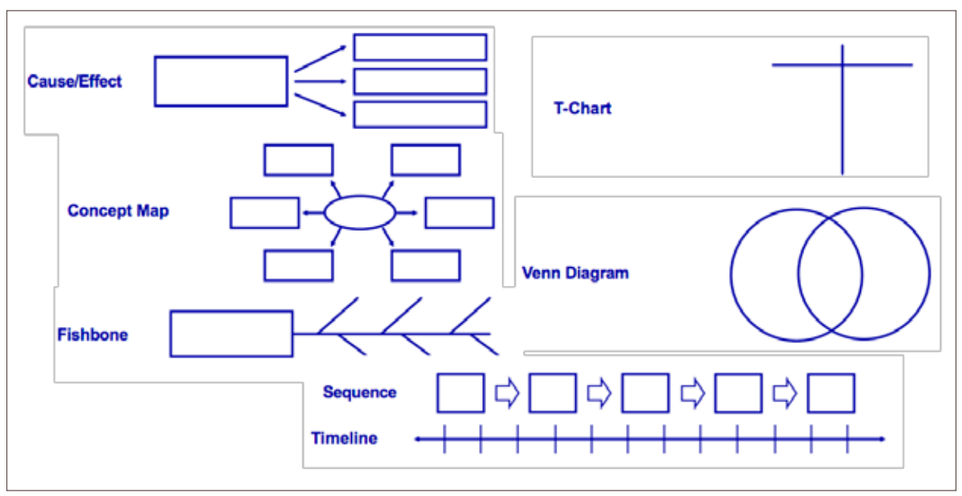
Developing Background with Advance Organizers— Teachers review examples of graphic organizers for building background knowledge before students annotate and analyze commercials and their methods of influencing people.

PEDAGOGICAL PRACTICES FOR THE 21ST CENTURY CLASSROOM

Research and Expert Opinion: Visual Learning Techniques

Graphic organizers are visual frameworks that often support higher order thinking skills. Graphic organizers support memory and retention, help sequence ideas and concepts, classify information, support decision making, encourage inductive thinking and help structure written tasks. (Bennett 2009)

- Brain research tells us: "Between 80 and 90 percent of all information that is absorbed by our brain is visual." (Jensen, 2008)
- Teaching with, and helping students strategically use, various forms of non-linguistic representation including graphic organizers and images, helps build important 21st century skills —the ability to organize ideas visually, analyze information, build vocabulary and improve comprehensions, integrate and retain new knowledge, clarify concepts and tap creativity. (Marzano, Pickering, & Pollock, 2001, 2004; AEL, 2003)
- Opportunities to work with graphic information within digital environments supports how "digital natives" think and learn, and how the future world of information and learning will most likely be shaped. (Prensky, 2001)



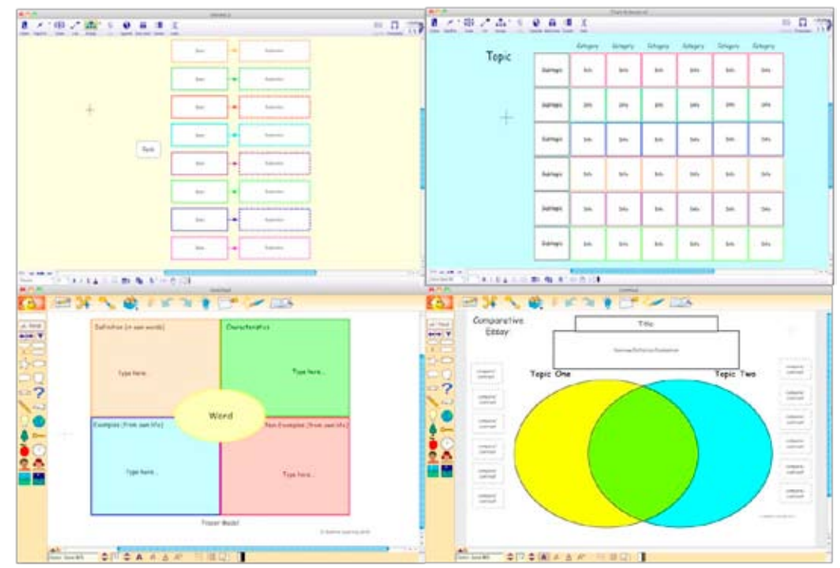
Graphic Organizers can support higher order thinking

PEDAGOGICAL PRACTICES FOR THE 21ST CENTURY CLASSROOM

Research and Expert Opinion: Visual Learning Techniques

In the Visual Learning Library (Kidspiration® and Inspiration®), teachers learn the purpose of graphic organizers, how they support thinking and learning, and ways to use them to complete a variety of thinking tasks including:

- **Sequencing**: cycles, timelines, flow charts
- **Sorting**: Venn diagrams, split trees, T-charts
- **Planning**: storyboards, KWL charts, inquiry planning, writing frameworks
- **Analyzing**: cause and effect charts, matrixes, concept maps, tree maps, Frayer Model
- **Evaluating**: charts for order of Importance, ranking, and pyramids



Sample organizers in the Visual Learning Library

In the **Interactive whiteboard library**, the very nature of the tool is visual. Throughout the videos, examples of the purposeful use of visual learning techniques are explored, including the use of images, shapes, and text mark ups. For example:

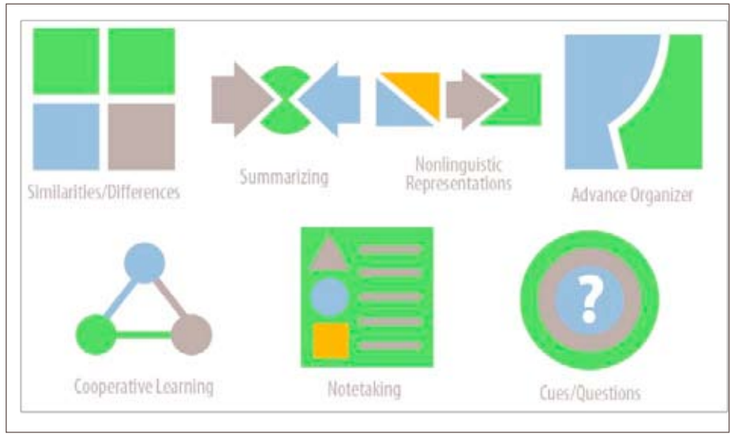
- **Semantic Features Analysis Charts** – to examine similarities and differences
- **Creating Tree Diagrams to Plan** – to categorize information visually
- **Perspectives Concept Frame** – to analyze characters and concepts

PEDAGOGICAL PRACTICES FOR THE 21ST CENTURY CLASSROOM

Research and Expert Opinion: Research-based Instructional Strategies

In 2001 Marzano, Pickering and Pollock using Marzano's 1998 meta-analysis of research on instruction, identified nine categories of instructional strategies that improve student achievement.

These include identifying similarities and differences; cooperative groupings; summarizing and note taking; cues, questions and advance organizers; and non-linguistic representation. (Marzano, Pickering, & Pollock, 2001)



Instructional Strategy Categories

In addition, many more instructional strategies are supported by research, including building vocabulary and building background knowledge (Marzano, Pickering, & Pollock, 2001); concept attainment (Bruner, Goodnow & Austin, 1956); Six Thinking Hats ™ (de Bono, 1985); Direct Instruction (Rosenshine, 1976) and Experiential Learning (Kolb 1984) to name but a few.

A more recent focus of researchers, government agencies, and educators is the use of technology to both enhance and support proven instructional strategies and student learning.

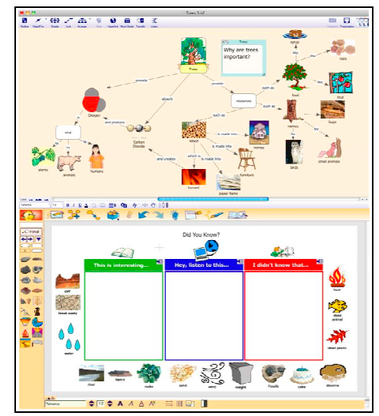
"Building lessons on a solid, research-based foundation of effective strategies, adding appropriate technologies, and consistently applying those strategies should help ensure high-quality instruction that has the potential of maximizing student achievement."
(Brabec, Fisher, & Pitler, 2004)

PEDAGOGICAL PRACTICES FOR THE 21ST CENTURY CLASSROOM

eTeachable Connection: Research-based Instructional Strategies

eTeachables use a variety of research-based teaching strategies within every 3-8 minute video. More than 60 strategies are featured and are searchable through the learning portal. Teachers can view multiple ways of addressing the strategy using different content and technology tools.

With explicit examples and explanations, the Visual Learning Library explores strategies such as non-linguistic representation, advance organizers, graphic organizers, writing to inform, concept mapping, and concept attainment.



Examples:

Mapping: Dozens of videos explore the design and use of maps and web to organize thinking, build concepts, explore hierarchies, develop vocabulary, and plan and execute written tasks.

Non-Linguistic Representation—Every video uses sound, image, shape, color, visual structure, and more, to support learning beyond words.

Each eTeachable in the Interactive Whiteboard Library focuses on three to five different instructional strategies, which are called out at the beginning of each video. For example:

- **Summarizing an Article**: Cooperative Learning, Feedback, and Summarizing
- **Place Value to One Million**: Assigned Questions, Building Vocabulary, Graphic Organizers, and Practice
- **S.M.A.R.T Goals and Vision Boards**: Goal Setting, Graphic Organizers, Non-linguistic Representation, and Think-Pair-Share

In the corresponding Professional Learning Guides, teachers are encouraged to reflect on the instructional strategies—how or if the teacher currently uses them and how technology supports and enhances them. The guides support teachers as they build a repertoire of proven instructional strategies, used purposely with technology to improve student learning.

PEDAGOGICAL PRACTICES FOR THE 21ST CENTURY CLASSROOM

Research and Expert Opinion: Universal Design for Learning (UDL)

Supporting the needs of all learners, once the responsibility of a select department or teacher, is now recognized as the responsibility of all educators. Teachers must plan for the various needs of learners to create a "foundation of fairness" so that every student can succeed.

UDL principles are based on neuroscience and the exploration of the three brain networks:

- **Recognition** (The WHAT of learning)
- **Strategic** (The HOW of learning)
- **Affective** (The WHY of learning)

"UDL provides a blueprint for creating instructional goals, methods, materials, and assessments that work for everyone--not a single, one-size-fits-all solution but rather flexible approaches that can be customized and adjusted for individual needs." (CAST, 2009)

"Advances in the learning sciences, including cognitive science, neuroscience, education, and social sciences, give us greater understanding of three connected types of human learning—factual knowledge, procedural knowledge, and motivational engagement. Neuroscience tells us that these three different types of learning are supported by three different brain systems." (NETP, 2010).

At the heart of UDL is "identifying and removing barriers from our teaching methods and curriculum materials." (Rose & Meyers, 2003) Technology and digital resources support this, providing multiple means and pathways for students to learn.

eTeachable Connection: Universal Design for Learning (UDL)

eTeachables are built on the principle of Universal Design for Learning. Each one models "multiple means" of:

- **Representation**: through the addition of images, video, modified text, audio files, websites, and interactive activities
- **Action and Expression**: through participation activities, blending of digital and physical manipulatives, digital/print/alternative software for written tasks and choice of assignments
- **Engagement**: through interactive activities, participation techniques, essential questions, a blend of class, group, and independent activities, and a balance of challenge and support

PEDAGOGICAL PRACTICES FOR THE 21ST CENTURY CLASSROOM

Research and Expert Opinion: Differentiated Instruction

Before teaching one considers: what students will learn, how they will learn it, and how they will demonstrate their learning. A variety of theories of learning go into differentiated instruction including: social psychology, motivation and learning, brain research, multiple intelligences, gender, multiethnic education, and zone of proximal development (Tomlinson, 2003). Parts of a curriculum that can be differentiated include: Content, Process, Products, Affect, and Learning Environment. (Tomlinson, 2001)

Teachers can also differentiate instruction in additional ways that include:

- Clarify key concepts and generalizations
- Use assessment as a teaching tool to extend rather than merely measure instruction
- Emphasize critical and creative thinking as a goal in lesson design
- Provide a balance between teacher-assigned and student-selected tasks (Tomlinson, 2001)

Differentiated Instruction is closely related to, and overlaps with, UDL. Both instructional practices and technology can support differentiation providing the "multiple means" (UDL) and "varied approaches" (DI) students require to be successful in their learning.

eTeachable Connection: Differentiated Instruction

eTeachables support differentiated instruction through explicit examples. As teachers watch different videos, they build up a collection of ideas applicable to other templates and lessons.

- In the eTeachable **Autobiography** (Visual Learning Library), the listen feature, symbol library, inclusion of personal photos and a simplified activity all support students at the pre-writing stage.
- In the eTeachable **Comparing and Adding Fractions** (Interactive Whiteboard Libraries) graphic organizers, color and the "least common multiple" tool help students who need visual support to complete tasks and understand math concepts
- In the eTeachable **Musical Autobiography** (Interactive Whiteboard Libraries), planning sheets, checklists and rubrics support organization. Students with auditory or memory problems are given focused tasks and repeat opportunities to complete the task successfully.

The eTeachable portal allows teachers to filter by DI population, bringing up a choice of videos that model different ways to support the same DI population. For example, searching by "ELL" results in a choice of videos across several libraries:

- **Visual Learning Library** – Base Ten Countdown
- **Kurzweil Library** – Introducing Key Vocabulary
- **Interactive Whiteboard Library** – Analyzing and Transforming Shapes with Geoboards
- **Interactive Whiteboard Library** – Explore, Organize and Present with Webs
- **Interactive Whiteboard Library** – Vocabulary Elaboration Strategy

CONCLUSION

Today's educators need access to technology-based resources that inspire them to provide more engaging and effective learning opportunities for each and every student. Sublime Learning's eTeachables are uniquely suited to support this goal.

eTeachables are manageable professional learning resources in the form of 3 to 8 minute videos, with accompanying templates and support materials. eTeachables model best practices of pedagogy and technology within a curriculum focus. They respond directly to the growing evidence for what is needed to integrate technology into instruction successfully.

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