Integrating Technology into the Classroom using
Classroom Instruction that Works:
Research-Based Strategies for Increasing Student Achievement
by Robert J. Marzano, Debra J. Pickering, Jane E. Pollock
The authors have examined decades of research to determine what teaching strategies have positive effects on student learning. These strategies are not new, but when teachers use these strategies effectively with their students, the outcome is a measurable difference in student achievement. Each of these strategies can be used by any teacher at any time, using either traditional teaching tools or using technology. This site provides ideas for using technology.

Identifying Similarities and Differences   Homework and Practice   Setting Objectives and Providing Feedback

Summarizing and Note Taking   Nonlinguistic Representations   Generating and Testing Hypotheses

Reinforcing Effort and Providing Recognition   Cooperative Learning   Cues, Questions, and Advanced Organizers

Note: Templates are in Microsoft Word. They can be downloaded as Word documents or can be downloaded as a PDF to print.
PDF of Additional Classroom Applications for Using Excel by Victoria Rasmussen at UEN

Identifying Similarities and Differences

1. Presenting students with explicit guidance in identifying similarities and differences
2. Asking students to independently identify similarities and differences.
3. Representing similarities and differences in graphic or symbolic form enhances students' understanding of and ability to use knowledge.

Technology Applications

- Inspiration and Kidspiration.
- Word processing program "call-out" shapes such as Microsoft Word's "speak shape" or "thought shape."
- Presentation software to fade back and forth (teacher presentation).
- Students graph numerical data with spreadsheet or graphing calculator emulator. The Graph Club
- Core curriculum—compare animal similarities.
- Use Excel to create graphs to demonstrate comparisons.
- Fingerprint graph—how many have swirls, etc.
- Table creation in Microsoft Word for comparison.
- Telecollaborative projects.
  - Templates:
    - Venn Diagram (p.18) Word Doc | PDF
    - Comparison Matrix (p.19) Word Doc | PDF
    - Categories (p.22) Word Doc | PDF
    - Metaphors (p.25) Word Doc | PDF
    - Analogies (p.28) Word Doc |PDF

Summarizing and Note Taking

1. Summarizing and Note Taking
   1. Students must delete some information, substitute some information, and keep some information.
   2. To effectively to this, students must analyze the information at a fairly deep level.
   3. Knowledge of the form or structure a piece of information will take is an aid, i.e., typical science chapter organization.
2. Note Taking
   1. Verbatim note taking is the least effective way to take notes.
   2. Notes should be considered a work in progress.
   3. Notes should be used as study guides for tests.
   4. The more notes that are taken, the better.

   Technology Applications

   - o Webbing.
   - o Graphic organizers.
   - o Inspiration—brainstorming, then use Outline option.
   - o Kidspiration—brainstorming, then use Outline option.
   - o Outlining in Microsoft Word, AppleWorks, or Corel WordPerfect
   - o Handheld computers (Palm.).
   - o World Book (online)—notepad
   - o Put PowerPoints online for student access.
   - o Use Excel to take and organize notes, create outlines of chapter headings and study quides.
     - ▪ Templates
       - ▪ Student Notes: Combination Technique (p.48) Word Doc | PDF

Reinforcing Effort and Providing Recognition

1. Effort—Keep track of effort and achievement.
2. Recognition
   1. Personalize recognition.
   2. Pause, prompt, and praise.
   3. Concrete symbolic recognition.

Technology Applications

- o Visit the Academy of Achievement to explore how effort can effect achievement. Students can read biographies and listen to interviews. (Start with the "Gallery of Achievement" and have students visit the "Steps to Success" to specifically see how character traits such as perseverance and preparation are related to achievement.)
- o Certificate templates using word processors.
- o Posters or Other Projects
- o Create rubrics.
- o Tracking charts using Tables in word processor or spreadsheet.
- o Create a book.
- o Web page sharing student work.
- o Online portfolios.

- o Burn CD of portfolio.
- o Email to student.
- o Email to student's home.
- o Multimedia presentation.
- o SIS
- o Desktop wallpaper—insert pictures for birthdays.
- o Use iMovie to create student presentation for recognition.
- o Create a student-produced newscast of notable events.
- o Use Excel to create tracking charts.
    - ▪ Templates
        - ▪ Effort and Achievement Rubric (p.52) Word Doc | PDF

Homework and Practice

1. Establish and communicate a homework policy.
2. Design homework assignments that clearly articulate the purpose and outcome.
3. Vary the approaches to providing feedback.

Technology Applications

- o Teacher webpages.
- o Multimedia presentations.
- o Rubrics.
- o Email completed assignments to teachers.
- o TIPS.
- o Use UEN Lesson Plan Tool to give or upload homework files.
- o Games—PowerPoint Jeopardy.
- o Use My Edesk and speed dial folders with hotlinks and file.
- o SIS.
- o Use Excel to create templates to enter data so that results can be seen instantly when one variable is changed.
    - ▪ Template:
        - ▪ Homework Assignment Form (p.65) Word Doc | PDF

Nonlinguistic Representations

The "dual-coding" theory of information storage postulates that knowledge is stored in two forms—linguistic (words) and imagery (mental pictures).

1. Create graphic organizers
    1. Descriptive Patterns
    2. Time-Sequence Patterns
    3. Process/Cause-Effect Patterns
    4. Episode Patterns
    5. Generalization/Principle Patterns
    6. Concept Patterns
2. Using other nonlinguistic representations
    1. Making physical models

2. Generating mental pictures
3. Drawing pictures and pictographs
4. Engaging in kinesthetic activity

Technology Applications for graphic organizers

o Tom Snyder TimeLiner
o Multimedia projects using PowerPoint, Corel Presentations, KidPix,
o HyperStudio.
o Web pages.
o Webbing software in Inspiration/Kidspiration. Graphic Organizer templates
o UEN
o Weather Project
o Pond Project
o Swan Project
o Tesselations software.
o Use Excel to create graphic organizers to visualize patterns, time-sequence, process, and cause-effect.
  ▪ Templates:
    ▪ Time Sequence Pattern Organizer (p.76) Word Doc |PDF
    ▪ Process/Cause-Effect Pattern Organizer (p.76) Word Doc | PDF
    ▪ Generalization/Principle Pattern Organizer (p.77) Word Doc | PDF

Technology Applications for other nonlinguistic representations

o Simulation software models—CAD, bridge building
o Flash
o Any paint program.
o Graphing calculator.
o KidPix.
o Digital cameras/video.
o Inspiration/Kidspiration

Cooperative Learning

1. Five defining elements
    1. Positive interdependence
    2. Face-to-face interaction
    3. Individual and group accountability
    4. Interpersonal and small group skills
    5. Group processing
2. Generalizations
    1. Use a variety of criteria for grouping students.
    2. Use a variety of grouping patterns
        1. Informal or ad hoc (last from a few minutes to a class period)
        2. Formal (long enough to complete an academic project—several days to several weeks)
        3. Long term (semester or year—provide students with long-term support)

http://t4.jordan.k12.ut.us/professional_development/strategies/

3. Keep groups small

Technology Applications

- George Lucas Foundation Instructional Module
  http://www.glef.org/PBL/index.html
- Tom Snyder software.
- WebQuests.
- Project-Based Learning.
- Interactive software.
- Arcview (GIS)
- Adaptations – KidPix.
- Group multimedia projects.
- E-Pals.
- ThinkQuest.
- Progressive stories with word processors.
- Peer editing using Notes function with Microsoft Office.
- Use Excel to collect data for group projects and to make predictions.

Setting Objectives and Providing Feedback

1. Goal setting
   1. Be specific but flexible.
   2. Contracts.
2. Feedback
   1. Corrective—provide a correct answer or an explanation of what is accurate and what is inaccurate.
   2. Timely.
   3. Feedback should be criterion-referenced as opposed to norm-referenced.
   4. Students can provide some of their own feedback.

Technology Applications

- Online rubrics (student/class/teacher –developed)
  UEN RubricTool
  Rubistar
- Templates:
  - Components of a General Rubric for Information (p.100)
  - Components of a Generic Rubric for Process and Skills (p.100)
- Advanced organizers.
- Reflective notes with Microsoft Office, etc.
- TIPS.
- Electronic portfolios.
- Inspiration/Kidspiration for brainstorming goals.
- George Lucas Foundation Instructional Module:
  http://www.glef.org/Assessment/index.html
- Use Excel to create an interactive worksheet to receive immediate feedback.

Generating and Testing Hypotheses

1. While hypotheses can be approached inductively or deductively, generally speaking deductive approaches reproduce better results.
2. Teachers should ask students to clearly explain their hypotheses and their conclusions.
3. Use a variety of structured tasks to guide students through generating and testing hypotheses.
    1. Systems analysis.
    2. Problem solving.
    3. Historical investigation.
    4. Invention
    5. Decision making

Technology Applications

- o Use computer version of "Mastermind."
- o Tom Snyder Decisions, Decisions.
- o Simulation software.
- o Interactive websites.
- o Graphs.
- o Use PowerPoint or another presentation program to introduce hypothesis.
- o UEN science projects: Swans; Ponds; Streams; Weather.
- o ARC GIS to work with real data (earthquake, volcano, etc.)
- o Use Excel to see stages of decision making, data collection, testing, estimating, correcting and evaluating final results.
- o Template:
    - ▪ Decision Making Grid (Worcester,p.62) Excel Format

Classrooom Practices

- • Systems Analysis
    - o Visit UEN's Themepark for a collection of resources dealing with a variety of systems. Marzano recommends students: 1) Explain the purpose of the system, the parts and functions of each part of the system; 2) Describe how the parts affect each other; 3) Hypothesize what would happen if a part of the system were changed; 4) Test the hypothesis if possible.
- • Problem Solving
    - o Have students create their own rollercoaster at Amusement Park Physics. Students must use information and knowledge to build a rollercoaster.
- • Historical Investigation
    - o Students can begin to understand how Historians investigate past events at You Be the Historian.
    - o The Learning Page from The Library of Congress is a great starting point to find lesson plans utilizing historical information.
- • Invention
    - o Students can create their own contraption at Invention at Play.
    - o Kids Design Network provides a setting for teachers to challenge students to create a specific product and seek advice from an engineer.
- • Experimental Inquiry

- o Students apply their understanding of gravity to recreate a comet crashing into Jupiter at Planet Impact.
- o Have students create their own rollercoaster at Amusement Park Physics. Students must use information and knowledge to build a rollercoaster.
- o Students can create their own contraption at Invention at Play.
- o Kids Design Network provides a setting for teachers to challenge students to create a specific product and seek advice from an engineer.
- Decision Making
  - o Students can participate in the decision making process using Tom Snyder's Decisions, Decisions series. Available as an online subscription or on CD.
  - o Teach students the decision-making process, including selecting items with the "most" or "least" of something using this Decision Making Grid (created in Excel).

To the Top

Cues, Questions, and Advanced Organizers

1. Cues (hints) and Questions
   1. Should focus on what is important as opposed to what is unusual.
   2. "Higher level" questions produce deeper learning than "lower level questions."
   3. "Wait time"
   4. Use questions before a learning experience.
2. Advance Organizers
   1. Expository
   2. Narrative
   3. Skimming
   4. Graphic advance organizers (see Graphic Organizers, above).

Technology Applications

- o With PDAs use Picomap.
- o With computers use Inspiration/Kidspiration.
- o Higher-level questioning—PowerPoint with images.
- o UEN—WWW.Activities to ask questions.
- o Post to MyEDesk or to shared site for student access.
- o Use Excel to create certain "table" types of advanced organizers.

To the Top