# Differentiating Your Science Curriculum For Elementary

Debbie Silver, Ed.D.

What does a differentiated classroom look like?

- Teacher responds to the variations in students' readiness.
- Teacher responds to the myriad of students' interest.
- Teacher respects the various students' learning style.
- Learning experiences are based on student readiness, interest, or learning profile.
- Assessment is ongoing.
- Tasks are adjusted based on assessment data.

  Teacher is primarily a coordinator of time and activities.
  Students work in a variety of groups & configurations.
  Time is flexible and is based on student needs.
  Teacher uses a variety of instructional strategies to help target instruction to student needs.
  Clearly established criteria used to support student success.

Zone of Proximal Development…ZPD
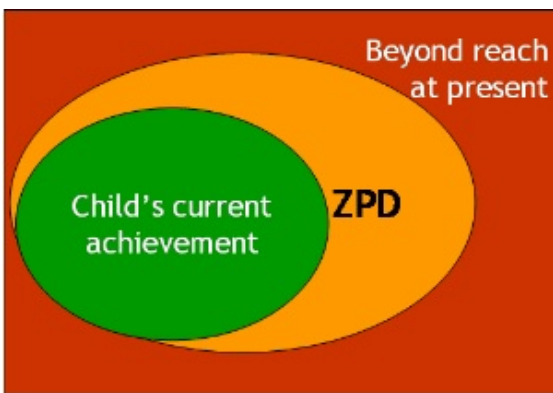
Zone of Proximal Development, an idea developed by Lev Vygotsky over one hundred years ago, seeks to define the process through which students effectively learn in cooperation with a teacher.

A student's Zone of Proximal Development, or ZPD, is defined as the student's range of ability with and without assistance from a teacher or a more capable peer. On one end of the range is the student's ability level without assistance. On the other end of the range is the student's ability level with assistance.

A classroom that makes the best use of all of its students' ZPDs should follow the following guidelines:

  The teacher should act as a scaffold, providing the minimum support necessary for a student to succeed. The idea is to assist without denying the student's need to build his or her own foundation. The challenge for the teacher, then, is to find the optimal balance between supporting the student and pushing the student to act independently. To effectively scaffold the student, the teacher should stay one step ahead of the student, always challenging him or her to reach beyond his or her current ability level. However, if instruction falls outside of the zone (above or below a student's ZPD), no growth will occur.

Adapted from: <http://www.wcer.wisc.edu/step/ep301/Spr2000/Jenna-B/zpd.html

Differentiated Instruction – Step One

Start a 3" x 5" note card for each student in your room. Put a student's name at the top.
On the card list the information such as:

Reading level-
English language proficiency level-
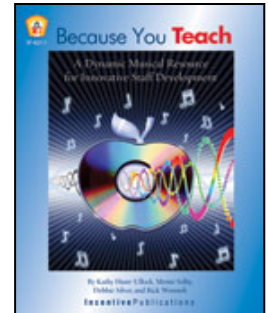**Level of adult supervision and involvement at home-**
Strength areas-
Weak areas-
Preferred learning style-
Personal interests-
Least favorite things-
Fears-

Add or delete items as you see fit for your needs. Fill in as much of the   information
as you can. Begin working to find out the areas with which   you are not familiar.
Update and add to the information as you learn more about the student. Periodically
review the information and use it to plan differentiated instruction, assignments, and
assessments.

**Activity from *Because You Teach: A Dynamic Musical Resource for Innovative Staff Development*
(2006) by** Kathy Hunt Ullock**,** Monte Selby **Debbie Silver**, **Rick Wormeli**. **Nashville, TN: Incentive
Publications.**

Using Technology To Differentiate Instruction

Verbal/Linguistic (Word Smart)
• CD-ROM interactive books, e-books, text to voice software
• **Create podcasts**
• Reading and interpreting web information
• **http://bubbl.us/**
• **http://voicethread.com**
• **http://www.wordle.net/**

Logical Analytical/Math (Number Smart)
• Spreadsheets
• Graphing calculators
• Online data collection
• Science and math websites and software
• Problem solving websites and software
• The Futures Channel   **http://www.thefutureschannel.com**

Naturalist (Nature Smart)
• **http://www.plt.org**
• **http://www.projectwild.org**
• **http://www.projectwet.org**

Bodily Kinesthetic (Body Smart)
• Video productions of skits, dances, etc.
• Claymation -- sequence of movement
• Lego Logo and Robotics
• Joysticks, keyboards, and other devices for fine motor control

Visual Spatial (Picture Smart)
• Multimedia presentations
• **www.googlelittrips.com**
• Tom Synder's Timeliner
• Photoshop
• 3D and morphing software
• Scrapbooking, slideshows, clipart, charts, graphs, and tables
• Digital cameras
• Concept mapping tools and diagrams **http://www.text2mind**
• **www.inspiration.com**

Musical (Music Smart)
• Video and audio recording devices (digitalize music)
• Music clips
• **Music composition software (Garage Band)**
• **www.songsforteaching.com**

Interpersonal Communication Skills (People Smart)
• Blogs
• Listservs
• Peer tutoring
• Social networking
• Collaborative computer software or games
• **Group presentations (PowerPoint/Keynote)**
• Tom Synder's Group Decision software
• Video conferencing

Intrapersonal Awareness (Self Smart)
• **Blogs**
• **Computer-based journaling**
• Computer-based editing
• Multi-media portfolios
• Internet research (self-paced)
• Problem-solving software
• Individual video projects
• Virtual Worlds

OTHERS:

_____

_____

_____

Name- _____

Essential Eight

The purpose of this "get acquainted" activity is to start thinking about the different areas of intelligence. Participants are to mix freely and try to get seven different people to sign the blanks (each participant may sign her/his own sheet once). In order to record a name in the blank, the person signing must actually perform the task (not just say that she/he can do it).

Find Someone Who Can:

_____ recite a poem from memory.

_____ finish this numerical sequence: 64, 1, 49, 4, 36, 9, 25, _____, and explain the logic behind it.

_____ within 20 seconds name 6 ways to sort rocks into categories.

_____ with hands on head stand on one foot with eyes closed for at least 7 seconds.

_____ recall at least one dream from the last 3 weeks.

_____ hum the first line of *Silent Night* on key.

_____ honestly say that he/she has more strengths than weaknesses and name 6 strengths in less than 15 seconds.

_____ name five very close friends in less than 8 seconds.

Debbie Silver, 1998

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Essential Eight

Name- _____

The purpose of this "get acquainted" activity is to start thinking about the different areas of intelligence. Participants are to mix freely and try to get seven different people to sign the blanks (each participant may sign her/his own sheet once). In order to record a name in the blank, the person signing must actually perform the task (not just say that she/he can do it).

Find Someone Who Can:

_____   recite a poem from memory.

_____   finish this numerical sequence: 8,1,7,2,6,3,5, _____, and explain the logic behind it.

_____   Name 4 ways plants are different from animals.

_____   with hands on head stand on one foot with eyes closed for at least 7 seconds.

_____   recall at least one dream from the last 3 weeks.

_____   hum the first line of *Silent Night* on key.

_____   tell 3 times they were very brave.

_____   name four very close friends in less than 8 seconds.

M. I. And Your Science Classroom

Logical-mathematical (Number/Puzzle Smart)
- Emphasize the underlying patterns children observe in science activities.
- Have students think about the steps involved in all deductions and activities.
- Stress numbers, measuring, and other mathematical concepts whenever possible.

Linguistic (Word Smart)
- Begin concept studies with popular children's books.
- Emphasize writing down predictions, observations, and writing in science journals.
- Encourage students to keep personal science dictionaries.
- Connect creative writing activities to science concepts.

Musical (Music Smart)
- Use songs, raps, and music selections to accompany the introduction of new concepts and/or to practice vocabulary.
- Encourage students to make up their own songs using science concepts.

Visual/Spatial (Picture Smart)
- Encourage students to use models and pictures to demonstrate understanding.
- Present new material through videos and pictures.
- Connect graphs to information whenever possible.

Bodily/Kinesthetic (Body Smart)
- Provide ample opportunities for students to use science materials and equipment.
- Whenever possible, have students demonstrate new learning through movement and dance. (i.e. acting out the metamorphosis of a butterfly).

Interpersonal (People Smart)
- When doing a cooperative activity help students "de-brief" not only their findings but also how well they worked together.
- Provide opportunities for students to share their findings, discoveries, and questions with their classmates.

Intrapersonal Awareness (Self Smart)
- Encourage the use of personal journals and reflective activities.
- Allow students to choose solitary, independent work occasionally.

Naturalist (Nature Smart)
- Use activities from programs such as Project Learning Tree, Project WILD/Aquatic, and Project WET that link science to the natural world.
- Use natural objects or media using natural objects to illustrate points.

Checklists for Assessing "How Students Are Smart"
Adapted by Debbie Silver
from *Multiple Intelligences* in the Classroom by Thomas Armstrong

Name of Student- _____

Check all the items that apply:

Linguistic Intelligence (Word Smart)
__1.　Is a good reader.
__2.　Enjoys word games.
__3.　Is a good joke teller/ storyteller.
__4.　Has a good vocabulary for age.
__5.　Enjoys listening activities.
__6.　Likes to write stories and/or poems
__7.　Communicates with others in a highly verbal way.
__8.　Appreciates rhymes, puns, and/or nonsense words.
__9.　Has a good memory for words, stories, details.

Other linguistic strengths:

Logical-Mathematical Intelligence (Number Smart)
__1.　Asks a lot of questions about how things work.
__2.　Has a good sense of cause and effect.
__3.　Finds math games interesting.
__4.　Can see and repeat patterns easily.
__5.　Enjoys working puzzles and brain teasers.
__6.　Understands computer programming.
__7.　Is a logical thinker.
__8.　Can estimate things involving numbers with relative ease.
__9.　Can work math concepts in head.
Other logical-mathematical strengths:

Visual-Spatial Intelligence (Picture Smart)
__1.　Reports clear, visual images (or dreams).
__2.　Can envision objects from more than one perspective.
__3.　Daydreams more than peers.
__4.　Likes to draw and/or create art projects.
__5.　Has a good eye for detail and color.
__6.　Is good at spatial games like chess and Tetris.
__7.　Likes movies, slides, or other visual presentations.
__8.　Can move between 2-dimensional and 3 dimensional representations
　　　 with ease.
__9.　Can read and/or create maps.

Other visual-spatial strengths:

Bodily-Kinesthetic Intelligence (Body Smart)
__1.　Is very coordinated.
__2.　Exceptionally mobile: moves, twitches, fidgets, taps when seated for
　　　 long.

__3. Enjoys working with clay, fingerpaint, and other tactile media.
__4. Can mimic others' gestures, posture, and movements
__5. Must touch anything new or interesting.
__6. Loves to take things apart and put them back together.
__7. Uses dramatic body movements for self-expression.
__8. Enjoys running, hopping, climbing, wrestling, or similar activities.
__9. Exhibits fine motor control (crafts, painting, etc.).

Other bodily-kinesthetic strengths:

Musical Intelligence (Music Smart)
__1. Can detect music that is off-key, off-beat, or disturbing in some way.
__2. Remembers melodies of songs.
__3. Taps rhythmically as he/she works or plays.
__4. Sensitive to environmental noise (rain on the windows, etc.).
__5. Plays a musical instrument and/or sings in a choir.
__6. Has a good singing voice.
__7. Responds favorably when music is played.
__8. Sings songs that he/she has learned.
__9. Unconsciously hums much of the time.

Other musical strengths:

Interpersonal Communications Intelligence (People Smart)
__1. Establishes meaningful peer relationships.
__2. Seems to be a natural leader.
__3. Empathizes with others.
__4. Likes to play with others.
__5. Shows good teamwork skills.
__6. Others seek this student's company.
__7. Has two or more close friends.
__8. Frequently acts as a mediator and/or peace maker.
__9. Enjoys teaching others.

Other interpersonal communication strengths:

Intra-personal Awareness Intelligence (Self Smart)
__1. Displays a sense of strong will.
__2. Enjoys playing or working alone.
__3. Has high self-esteem.
__4. Has a good sense of self-direction.

__5. Does not mind being different from others.
__6. Has a realistic view of his/her strengths and weaknesses.
__7. Is able to deal effectively with successes and failures.
__8. Has an interest or talent that is not readily shared with others.
__9. Seems to "march to the beat of a different drummer."

Other intra-personal awareness strengths

Naturalistic Intelligence (Nature Smart)
__1. Likes to identify and classify living and nonliving things in nature.
__2. Cares for pets or animals.
__3. Understands repeating patterns in nature and the universe.
__4. Seems more "in tune with nature" than peers.
__5. Would rather be outside than inside.
__6. Has a demonstrated appreciation for a part of the natural world
     (i.e. dinosaurs, clouds, rocks, etc.)
__7. Likes to garden and/or appreciates plants.
__8. Understands and appreciates the environment.
__9. Loves to collect things from nature.

Other naturalistic strengths

Cartesian Diver

Introduction:
     The Cartesian Diver was made popular in the 1800's by the philosopher Rene Descartes. It is commonly found in science classrooms or perhaps you have seen the *Diving Tony* toy distributed in boxes of Frosted Flakes. The Cartesian diver offers an eloquent demonstration of the most unique property of a gas, its compressibility.

Materials:

One 2-liter plastic bottle with cap
One glass eyedropper

Procedure:
1)   Fill the bottle with water.
2)   Fill a glass with water.
3)   Draw water into the dropper until it is 2/3 full.
4)   Place the dropper into the glass of water. If it sinks, adjust the water level until the dropper floats.
5)   Place the dropper into the 2-liter bottle and screw the cap tightly in place.

Activity:
Hold the bottle in one hand and squeeze. What do you observe? Release the pressure with your hand and observe again.

Questions:
Why does the dropper sink when you apply pressure to the bottle?
As you squeeze the bottle the pressure inside increases. Liquids are not compressible but gases are. Therefore, the air in the dropper compresses and allows more water to flow into the dropper. This increases the weight of the dropper. As the weight increases, the density increases until it becomes greater than the density of water. Objects that have a density greater than water will sink.

Why are gases compressible and liquids not?
In gases the molecules are very far apart compared to their size. In other words, gases are mostly empty space. When put under increased pressure, the gas molecules can move closer together and the gas will occupy less volume.
On the other hands, in liquids the molecules are already crowded very close together. Since there is no empty space between the molecules, an increase in pressure cannot cause a decrease in volume.

Remote Control Cartesian Diver
By Dr. Bill Deese, Louisiana Tech University

You can amaze your students by operating your Cartesian Diver by "remote control." Start with the standard Cartesian Diver set-up. Drill a hole in the bottle top just large enough to accommodate a piece of aquarium tubing.   Use another bottle (any size, but smaller is usually more

convenient). Drill a hole in its cap also large enough to accommodate the aquarium tubing. Fill the second bottle with water and insert a piece of aquarium tubing 3 or more feet long inside each bottle.

By squeezing the small bottle, you will increase the pressure in it. The increased pressure in the small bottle will result in an identical increase in pressure in the large bottle, thus sending the Cartesian Diver to the bottom of the large bottle by a "remote control" device.

Some sneaky teachers we know even hide the "remote control" so that they can seemingly command the Cartesian Diver to dive by voice control alone. We highly recommend this procedure! It really causes the students to think about what is happening.

This activity demonstrates the principle that pressure is the same throughout a fluid.

Density and Buoyancy
CARTESIAN DIVER
Disc 12-22

rubber bulb
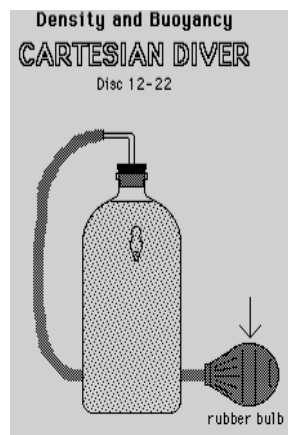
Logical Analytical/Linguistic

Science Fact Sense

_____ = Number of _____

a. 7   = Number of C in the R

b. 6   = Number of S of a SF

c. 3   = Number of B P on an I

d. 4   = Number of S in a Y

e. 8   = Number of L on a S

f. 3   = Number of S in the WC

Make Up Your Own-

TOPIC: _____
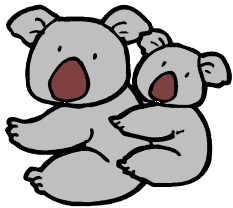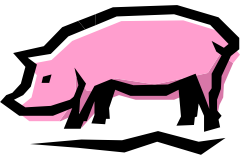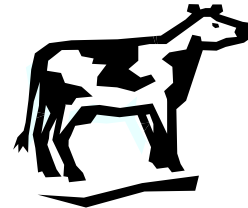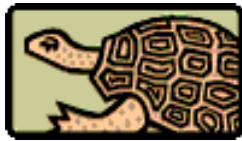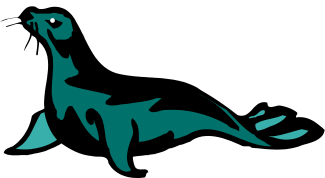
_____

_____

_____

_____

_____

These Are Barfs: **These Are NOT Barfs:**

Which of These Are Barfs?

Ways to Manage Your Differentiated Classroom
(from Betty Hollas, 2005)

• **Build relationships with students.**

• **Open pathways for students to construct meaning from the content you teach.**

• **Structure students' interactions with one another.**

• **Encourage students to interact with the information they are learning in ways that challenge, engage, and actively involve them.**

Diffierentiating Instruction

CONTENT:

1. **Use reading materials at varying readability levels.**

2. **Put text materials on tape.**

3. **Use spelling and/or vocabulary lists at readiness levels of students.**

4. **Present ideas through both auditory and visual means.**

5. **Use reading buddies.**

6. **Meet with small groups to re-teach an idea or skill for struggling learners or to extend the thinking or skills of advanced learners.**

PROCESS:

1. Use tiered activities through which all learners work with the same important understandings and skills but proceed with different levels of support.

2. Provide interest centers that encourage students to explore subsets of the class topic or particular interest to them.

3. Develop personal agendas to be completed either during a specified agenda time or as students complete work early.

4. Offer manipulatives or other hands-on supports for students who need them.

5. Vary the length of time a student may take to complete a task in order to provide additional support for a struggling learner or to encourage an advanced learner to pursue a topic in greater depth.

PRODUCT:

Different Ways to Find Out What Students Understand		
Make a chart or diagram	Do a demonstration	Create a dance
Write a letter to the editor	Make a scrapbook	Design a Web Quest
Conduct a discussion	Participate in a debate	Create a puppet show
Create an advertisement	Make an editorial video	Keep a journal log
Write an essay	Design a structure	Create a report
Participate in a simulation	Develop a collection	Make a plan
Create a poem	Write and do a rap	Make a mural
Do a photo essay	Design a game	Create a new product
Create an invention	Present a news report	Do an experiment
Teach someone else	Judge an event	Make a model
Write an analogy	Conduct an interview	Develop a rubric
Participate in a mock trial	Create cartoons	Write a book
Design and teach a class	Create a flow chart	Make a learning center
Devise a new recipe	Give a performance	Draw a blueprint
Write a monologue	Defend a theory	Do a self-assessment
Illustrate a math concept	Create a brochure	Solve a mystery
Do a multimedia presentation	Develop an exhibit	Critique a book
Write a diary from the perspective of someone else	Set up a system of checks and balances	Do a Gallery Walk (Carousel Walk)

Naturalist

Project Learning Tree (PLT) is an award-winning environmental education program designed for teachers and other educators, parents, and community leaders working with youth from grades PK-12. PLT uses the forest as a "window" on the world to increase students' understanding of our environment; stimulate students' critical and creative thinking; develop students' ability to make informed decisions on environmental issues; and instill in students the commitment to take responsible action on behalf of the environment.
http://www.plt.org/

Project W.I.L.D./Aquatic Project WILD is an interdisciplinary, supplementary environmental and conservation education program for educators of grades K-12. The program emphasizes wildlife because of its intrinsic and ecological values, as well as its importance as a basis for teaching how ecosystems function.
http://www.projectwild.org/

Project W.E.T. Project WET (Water Education for Teachers) is a nonprofit water education program and publisher for educators and young people ages 5-18. The program facilitates and promotes awareness, appreciation, knowledge, and stewardship of water resources through the dissemination of classroom-ready teaching aids and establishment of internationally sponsored Project WET programs. http://www.projectwet.org/

"Music Smart" Definition
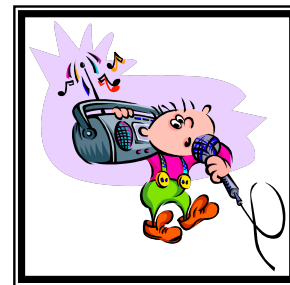
Students who are "music smart":

- **The "Music Smart" student has the capacity to think in music, to be able to hear patterns, recognize them, remember them, and perhaps manipulate them.**

- **These students can "play music" inside their heads even in a quiet room. People who have a strong musical intelligence don't just remember music easily -- they can't get it out of their minds because it's so ever present.**

- **"Music Smart" students can often remember large quantities of narrative when they learn it through music.**

- **Certain music and rhythms trigger their memory of facts and experiences.**

Learning Center Plan

Topic or Subject:

Standards:

Essential Ideas:

Activities:

Materials:

Location:

Assessment:

Teacher Comments:

Learning Centers

1. **Make directions clear.**
2. **Make directions comprehensive.**
3. **Provide incentives and reinforcements.**

TIPS:

A. **Laminate everything.**
B. **Number & label pieces for easy pick-up & storage.**
C. **Use "blogs" and/or interactive journals.**
D. **Use sign-in sheets, logs, charts, etc. for record keeping.**
E. **Monitor frequently and give feed-back.**
F. **Change centers often.**
G. **Encourage students to help create, add to, and improve centers.**
H. **Use center monitors when appropriate.**
I. **Use volunteers to create and monitor centers.**

Common Principles of Differentiated Instruction

Flexible grouping: matching students to skill work by virtue of readiness, not with the assumption that all need the same task, computation skill, writing assignment, etc. Movement among groups is common, based on readiness on a given skill and growth in that skill.

Tiered instruction: using varied levels of activities to ensure that students explore ideas at a level that builds on their prior knowledge and prompts continued growth. Student groups use varied approaches to exploration of essential ideas.

Source:
<http://www.mcps.k12.md.us/DEPARTMENTS/EII/gr/eiihomebutton.jpg>

Hanimals

By Mario Mariotti
Green Tiger Press
La Jolla, CA 92038

"The human hand is of great symbolic importance. With it we touch others, we bless, we pray, we speak, we greet, we nurture. Early men deliberately painted their hands on the walls of caves."

DIRECTIONS:

-Use powdered tempra mixed with liquid starch (found at larger food stores and Wal Marts) and a squirt of liquid soap. Be sure to use enough paint to achieve a strong color). This is the foundation color for your animal. Apply with brush, cotton, or by immersion.

-Use acrylic paints for the details of your hanimals. Art brushes work well.

-Your creation's eyes can be glued into place (I use eyelash adhesive sold in drug stores and at Wal Mart). Dolls eyes are useful as well as buttons, marbles, game pieces, clay, and ping pong balls. They can also be painted directly onto the hand.

Like Captured Fireflies

In her classroom our speculations ranged the world.
She aroused us to book waving discussions.
Every morning we came to her carrying new truths, new facts, new ideas cupped and
sheltered in our hands like captured fireflies.
When she went away a sadness came over us,
But the light did not go out.
She left her signature upon us,
The literature of the teacher who writes on children's minds.
I've had many teachers who taught us soon forgotten things,
But only a few like her who created in me a new thing, a new attitude, a new hunger.
I suppose that to a large extent I am the unsigned manuscript of that teacher.
What deathless power lies in the hands
of such a person.

John Steinbeck

Using the New Bloom's Taxonomy to Design Meaningful Learning Assessments Kevin Smythe & Jane Halonen
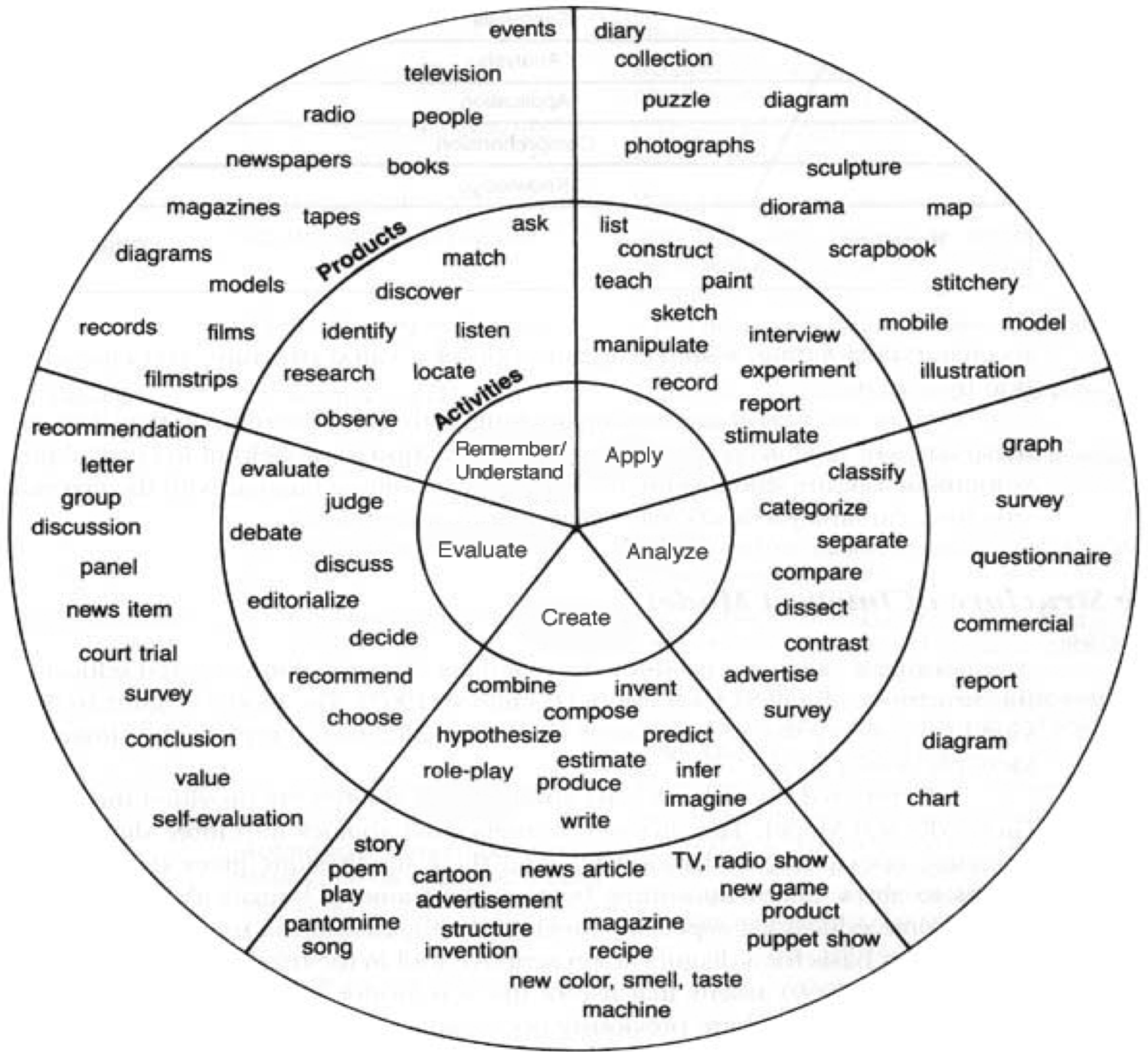
Based on: Clark, B. (2002). Growing up gifted: Developing the potential of children at home and at school. Upper Saddle River, NJ: Merrill Prentice Hall.

Retrieved from: http://www.apa.org/ed/new_blooms.html

Tiered Assignments

Rationale:

• Blends assessment and instruction

• Allows students to begin learning from where they are

• Allows students to work with appropriately challenging tasks

• Allows for reinforcement or extension of concepts and principles based on student
   readiness

• Allows modification of working conditions based on learning style

• Avoids work that is anxiety-producing (too hard) or boredom-producing (too easy)

• Promotes success and is therefore motivating

Guidelines for Use:

   1. Be sure the task is focused on a key concept or generalization essential to the
       study.

   2. Use a variety of resource materials at differing levels of complexity and
       associated with different learning modes.

   3. Adjust the task by complexity, abstractness, number of steps, concreteness, and
       independence to ensure appropriate challenge

   4. Be certain there are clear criteria for quality and success

   (Tomlinson, 2001, p. 101)

Preassessment is vital when addressing advanced reading needs. Results from pre-assessments must be employed to guide teachers' use of curriculum compacting, tiered assignments, and flexible groups. Pre-assessment is needed to accomplish the following:

*   **Determine students' instructional reading levels and skill needs.**
*   **Group students flexibly by readiness and the skills that need to be learned.**
*   **Analyze students' application of reading strategies.**
*   **Provide information for selecting and pacing appropriate instructional
        materials.**

Types of assessment that can be used as pre-assessments

- Checklists
- Interest inventories
- Observations
- Performance tasks
- Process interviews
- Reading tests
- Records of independent reading
- Running records
- Students' self-evaluations
- Teachers'-selected reading samples
- Writing samples

Pre-assessment: a way to determine what students know about a topic before it is taught. It should be used regularly in all curricular areas. Teachers can use the information gained in pre-assessment to make instructional decisions about student strengths and needs. Pre-assessment will help the teacher determine flexible grouping patterns as well as which students are ready for advance instruction. Here are a few examples of pre-assessment strategies:

  * Teacher prepared pretests
  * KWL charts and other graphic organizers
  * Writing prompts/samples
  * Questioning
  * Guess Box
  * Picture Interpretation
  * Prediction
  * Teacher observation/checklists
  * Student demonstrations and discussions
  * Initiating activities
  * Informational surveys/Questionnaires/Inventories
  * Student interviews
  * Student products and work samples
  * Self-evaluations
  * Portfolio analysis
  * Game activities
  * Show of hands to determine understanding: Every Pupil Response
  * Drawing related to topic or content
  * Standardized test information
  * ISM data
  * Anticipation journals

Criteria for Rubrics

Complexity	Too simple or not appropriate	Simple information; limited critical thinking	Information shows critical thinking; compares and contrasts	Beyond expectations; analyzes from multiple points of view
Content Depth	Needs more information or more accurate information	Needs to add depth or elaboration	Covers topic well; develops information beyond facts and details	Precise; in-depth; supports content

From: *Reading Instruction for the Primary Gifted Learner* by Bertie Kingore,Ph.D
http://www.bertiekingore.com/readinginstruction.htm

Designing a Tiered Assignment

Procedures for Developing a Tiered Activity

1. Select the concept, skill, or generalization to be addressed.
2. Determine the students' readiness and/or interests.
3. Create an activity that challenges most students, is interesting, and promotes understanding of key concepts.
4. Vary the activity appropriately for students with fewer skills.
5. Create additional activities that require high levels of thinking, are interesting, and use advanced resources and technology. Determine the complexity of each activity to document those that will challenge above-grade-level students and gifted learners. Ensure that each student is assigned a variation of the activity that corresponds to that student's readiness level.

Low Prep Tiering:

- Choices of reading material and/or reading buddies
- Number of steps involved
- Time Allotment
- Supplemental materials (calculator, dictionary, note cards, etc.)
- Mini-teacher led workshops to teach or re-teach skills
- Varied levels of questions (Bloom's Taxonomy)
- Others? _____

Higher Prep Tiering:

- Learning/Interest centers
- Audio/visual resources
- Cubing
- Project/portfolio assignments
- Varied levels of knowledge demonstration (Bloom's Taxonomy)
- Others? _____

Tiered Activities

To Vary the Level of a Lesson

Subject Area: **Grade Level:**

Outcome/ Performance Indicators			
Assessment			
Instruction/ Learning Activity			
Resources			
Assignments			

Pre-assessment:

Teacher Demonstration Checklist

In deciding whether a particular activity or demonstration is consistent with good science teaching, the following checklist (adapted from J. Abruscato's *Teaching Children Science,* 2001, p. 83) may prove helpful:

_____ 1. Did the teacher have all the necessary materials ready? Did the demonstration take place without unnecessary delay?

_____ 2. Was the demonstration straightforward and free from confusing complexities or details?

_____ 3. Could all the students observe the demonstration without problem?

_____ 4. Was the teacher prepared and confident? Was it obvious the teacher had practiced and was knowledgeable about all aspects of the concepts being conveyed?

_____ 5. Was the teacher able to build suspense with the demonstration? Were the students surprised by an unexpected or dramatic result?

_____ 6. Was the demonstration made with attention to the safety of all involved? Did the teacher model correct safety procedures? (i.e. wearing safety glasses, using a mitt, etc.)

_____ 7. Did the demonstration directly relate to the topic of study and/or essential science understandings?

_____ 8. Was the appropriate amount of time allocated for this demonstration? Was time given for drawing conclusions?

_____ 9. Did the students have an opportunity to give reactions, ask questions, make statements?

_____ 10. Did the demonstration provide an important learning experience for the students?

Helpful Elementary/Middle Internet Sites

Activities for Secondary Science Students

http://www.asta.edu.au/st2003/audience/secondary.html
Excellent resource. Science & Technology Directory for 2003-2004.

Classroom Activities for Secondary Science
http://www.greece.k12.ny.us/task/activities/secondscience.htm
More resources and activities for secondary science teachers

KCK Secondary Science Assessment Prompts
http://kancrn.kckps.k12.ks.us/science/assessment/prompts.cfm
Great downloadable resources for alternative secondary science assessments

ICT Teaching and Assessing Science
http://ecs.lewisham.gov.uk/talent/secsci/TaLENT_SC5.htm
Ideas for teaching and assessing secondary science through ICT

Problem Solving in Elementary Schools
http://www.indiana.edu/~reading/ieo/bibs/probele.html
ERIC resources that address problem solving. Useful links to other Internet resources.

Science Lesson Plans
http://www.col-ed.org/cur/science.html#sci1
This site, sponsored by the Columbia Education Center in Oregon provides a tremendous collection of elementary/middle level science lessons.

Sensational Science Activities
http://www.tufts.edu/as/wright_center/fellows/jbm_info/jbm6.html
Home page created for secondary science educators by John Banister-Marx. Good stuff!

Supplements to Science Lessons
http://www.monroe2boces.org/programs.cfm?sublevel=350&subsubpage=82&subpage=54&master=3
BOCES2 website provides an array of elementary science lesson supplements. Excellent resources for teachers trying to differentiate instruction on particular topics.

Teachernet Science Resources
http://www.teachernet.gov.uk/teachingandlearning/subjects/science/primaryscience/
One of the best sites on the internet for all kinds of activities, ideas, and integrated lesson plans for primary school science.

Using Lower Secondary Science Activities to Engage Below Level Students
www.eddept.wa.edu.au/outcomes/**science**/suppLsec.pdf
This downloadable PDF file has excellent ideas for differentiating secondary science activities for below level students.

Compiled by Debbie Silver, 2005

More Differentiating Instruction Resources:

http://www.learnerslink.com/curriculum.htm
Comprehensive compilation of effective D.I. strategies to Improve student -performance

http://www.adaptivecurriculum.com/us/lessons-library/hs-biology.html
Adaptive activities for high school biology students.

http://www.adaptivecurriculum.com/us/lessons-library/hs-chemistry.html

Adaptive activities for high school chemistry students.

http://www.adaptivecurriculum.com/us/lessons-library/hs-physics.html
Adaptive activities for high school physics students.

http://www.doe.in.gov/exceptional/gt/tiered_curriculum/
Ideas for tiered assignments in secondary science complied by the Indiana Department of Education.

http://www.manhattan.k12.ca.us/staff/pware/diff/
Tiered lesson plans for secondary school science offered by the Manhattan Beach Unified School District

http://www.cteresource.org/featured/differentiated_instruction.html
Learning Styles, Multiple Intelligences, and Differentiated Instruction from Virginia's CTE Resource Center

http://school.discoveryeducation.com/lessonplans/earthsci.html
Discovery Education science activities for secondary Earth science

http://www.hssd.k12.wi.us/forestglen/pathfinders/tier.htm
Tiered activities on rocks and minerals

http://www.teach-nology.com/teachers/lesson_plans/science/earth_sciences/
Earth science lesson plans

Compiled by Debbie Silver, 2010

LIST OF RELATED CITATIONS
"DIFFERENTIATED INSTRUCTION FOR ELEMENTARY GRADES"
PRESENTED FOR STAFF DEVELOPMENT FOR EDUCATORS (SDE)
BY DR. DEBBIE SILVER

Abruscato, J. (2001). *Teaching Children Science: Discovery Methods for the Elementary and Middle Grades*. Boston, MA: Allyn and Bacon.

Abruscato, J. (2000). *Teaching Children Science: A Discovery Approach (5th ed.)*.
Boston, MA: Allyn and Bacon.

Carin, A. A. & Bass, J.E. (1997). *Methods for Teaching Science as Inquiry*. Upper Saddle River, NJ: Prentice-Hall, Inc.

Carin, A. A. & Bass, J.E. (1997). *Activities for Teaching Science as Inquiry*. Upper Saddle River, NJ: Prentice-Hall, Inc.

National Science Teachers Association. (1997). *NSTA Pathways to the Science Standards: Guidelines for Moving the Vision into Practice (both middle and high school editions)*. Arlington, VA: National Science Teachers Association.

Feldkamp-Price, B.; Rillero, P.; & Brownstein, E. (1994). "A Teacher's Guide to Choosing the Best Hands-on Activities." *Science and Children (31)* 6, pp 16-19.

Piaget, J. (1974). *To understand is to invent*. New York: Grossman.

Silver, D. (2002). *Drumming to the Beat of a Different Marcher: Finding the Rhythm for Teaching a Differentiated Classroom*. Nashville, TN: Incentive Publications.

Silver, D. (1998). Engaging students in the learning cycle. *Principal*, 77 (4), 62-64.

Vatterrot, C. (1995). Student-focused instruction: Balancing limits with freedom in the middle grades. *Middle School Journal, 28* (2), 28-38

Periodicals for Science Teachers
Science and Children (elementary grades-- a journal of the National Science Teachers Association) 3140 N. Washington Blvd., Arlington, VA 22201 http://www.nsta.org

Science Scope (intermediate/middle grades-- a journal of the National Science Teachers Association) 3140 N. Washington Blvd., Arlington, VA 22201 http://www.nsta.org

WonderScience (grades 4-6). American Chemical Society, P.O. Box 57136, Washington, DC 20037.