

The Science Classrooms Today: Trends in Effective Learning



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Designing and Implementing UbD-based Learning Plan Effectively

21st Century Teaching Strategies

Lesson Demonstration Using Vibal Educational Resources



The Perfect Online Teacher?



21st Century Teacher

Who is a 21st Century Learner?

How do
they Learn?



What do
they need?

What do we need to do to support them?

21st Century Skills

- ✓ Critical Thinking and Doing
- ✓ Creativity
- ✓ Collaboration
- ✓ Cross-cultural understanding
- ✓ Communication
- ✓ Computing
- ✓ Career and Learning Self-reliance



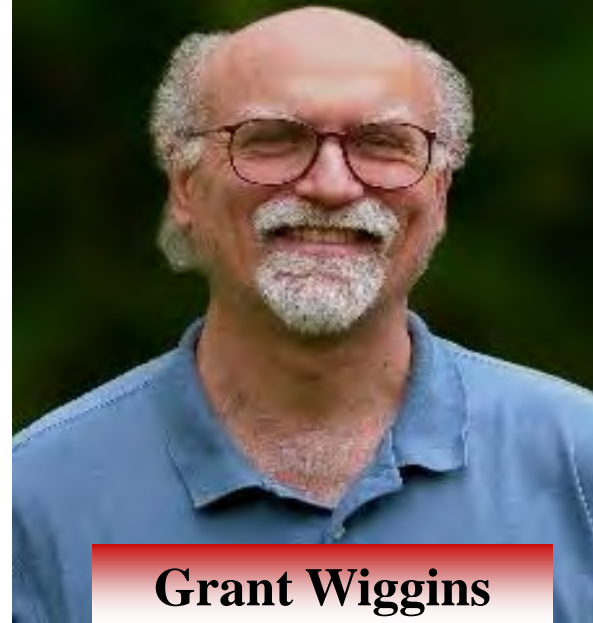




Teaching for *U*nderstanding



Jay McTighe



Grant Wiggins

In 1998, UbD espouses the process of “**backward design**” in the development of a school curriculum.

Backward design Versus Traditional Method

✿ Backward design is geared to eliminate two common flaws in the traditional method: coverage-focused teaching and activity-focused teaching.

✿ In **coverage-focused teaching**, educators try to cover all topics as specified by a textbook or teaching manual for the whole school year, but end up with students who do not understand why they are being taught all this information.

✿ In **activity-focused teaching**, educators come up with all sorts of activities that students participate in and enjoy, but again, students do not completely understand why.

Backward Design

It is a proposed design for a curricular framework, a course program, a unit plan, learning system, and instructional design.

Components:

- ◆ Educational objectives and content
- ◆ Teaching-Learning Strategies
- ◆ Assessment



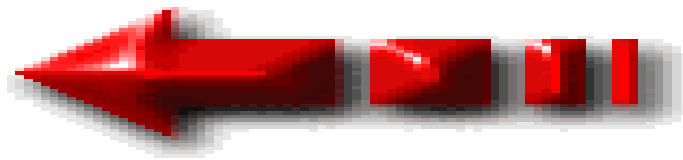
UbD in a Nutshell

- ✿ A way of thinking purposefully about curricular planning
- ✿ End goal is student understanding reflected in the ability to transfer learnings.
- ✿ Educators are coaches of understanding... responsible for “learning” not just “teaching.”
- ✿ Planning is best done “backward” from the desired results and assessment tasks
- ✿ Uses learning targets via “big ideas.”





Principle	Concepts	Strategies
Life exists in many different forms.	There are many kinds of plants and animals. There are many kinds of other organisms.	Laboratory activities Field Trips Film Showing



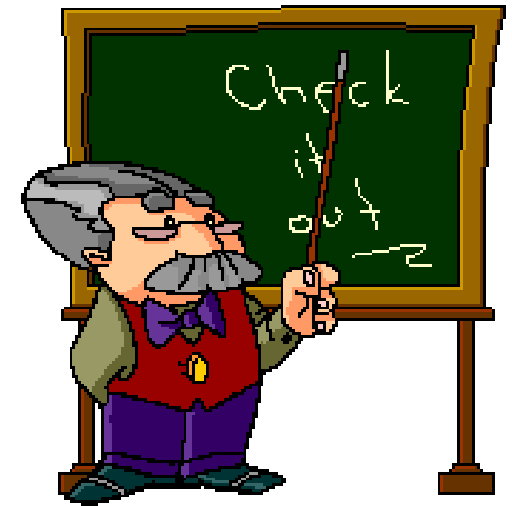
**Identify
desired
results.**

What do you want
students to know
and be able to do?
Write learning goals
or outcomes **first**.

**Determine
acceptable
evidence.
(assessment)**

- Performance task (a project)
- Criterion-referenced assessment (test or quiz)
- Unprompted assessment or self-assessment (observations, discussion)

**Plan learning
experiences
and
instruction.**



UbD Lesson Plan

Title: Unit 1 Competency 1 Subject/Course: _____

Topic: _____ Grades: 7th Designers: _____

Stage 1 – Desired Results

Established Goals:

Understandings:

Students will understand that...

Essential Questions:

Students will know....

Students will be able to....

Stage 2 – Assessment Evidence

Performance Tasks: *Summary in GRASPS form*



Key Criteria



Other Evidence



Stage 3 – Learning Plan

Learning Activities *Consider the **WHERE**TO elements*

Resources

ESSENTIAL UNDERSTANDING:



- ✿ “moral of the story” of the unit
- ✿ transferable to other lessons, subjects, contexts
- ✿ an insight
- ✿ makes sense of otherwise discrete facts
- ✿ specific generalization, a full sentence proposition

ESSENTIAL QUESTIONS:



- ✿ Have no simple “right” answer; they are meant to be argued.
- ✿ Designed to provoke and sustain student inquiry
- ✿ Address the conceptual foundations of your subject
- ✿ Raise other important questions
- ✿ Stimulate vital, ongoing rethinking of big ideas, assumptions, and prior lessons.

Essential questions often begin with . .

Why?

Which?

How?

What if?



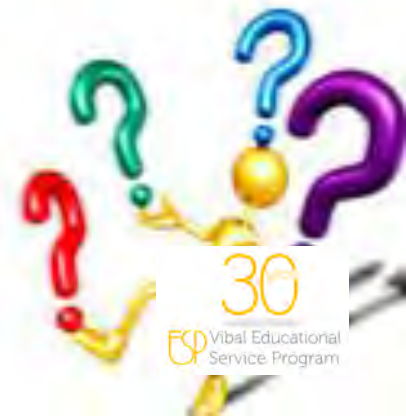
Why do things happen the way they do?

Which do I select?

How could things be made better?

Which is best?

What if this happened?



Topic	Big Idea/ Enduring Understanding	Essential Questions
Scientific Method	<ul style="list-style-type: none"> •Scientific method is a way of doing things. •Skills are developed and not inherited. •Scientific method helps solve problems in a systematic way. 	<ul style="list-style-type: none"> •What happens when the scientific method is not followed? •Can you make a good conclusion without performing an experiment? •How do we solve daily problems?
Earth Science	<ul style="list-style-type: none"> •Without water, life will be impossible. •Sun drives the global atmospheric change. •Man’s activities have contributed to changes in the composition of the atmosphere. •Nature has the ultimate recycling program- moving materials from earth’s interior to the surface and to the atmosphere and back. 	<ul style="list-style-type: none"> •How does man contribute to the degradation of the environment? •How are you affected by weather conditions? •How does plate tectonics explain the relationship between volcanism, earthquakes, and mountain formation?

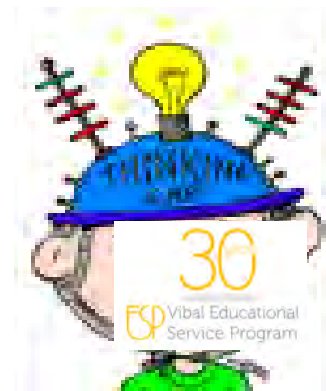


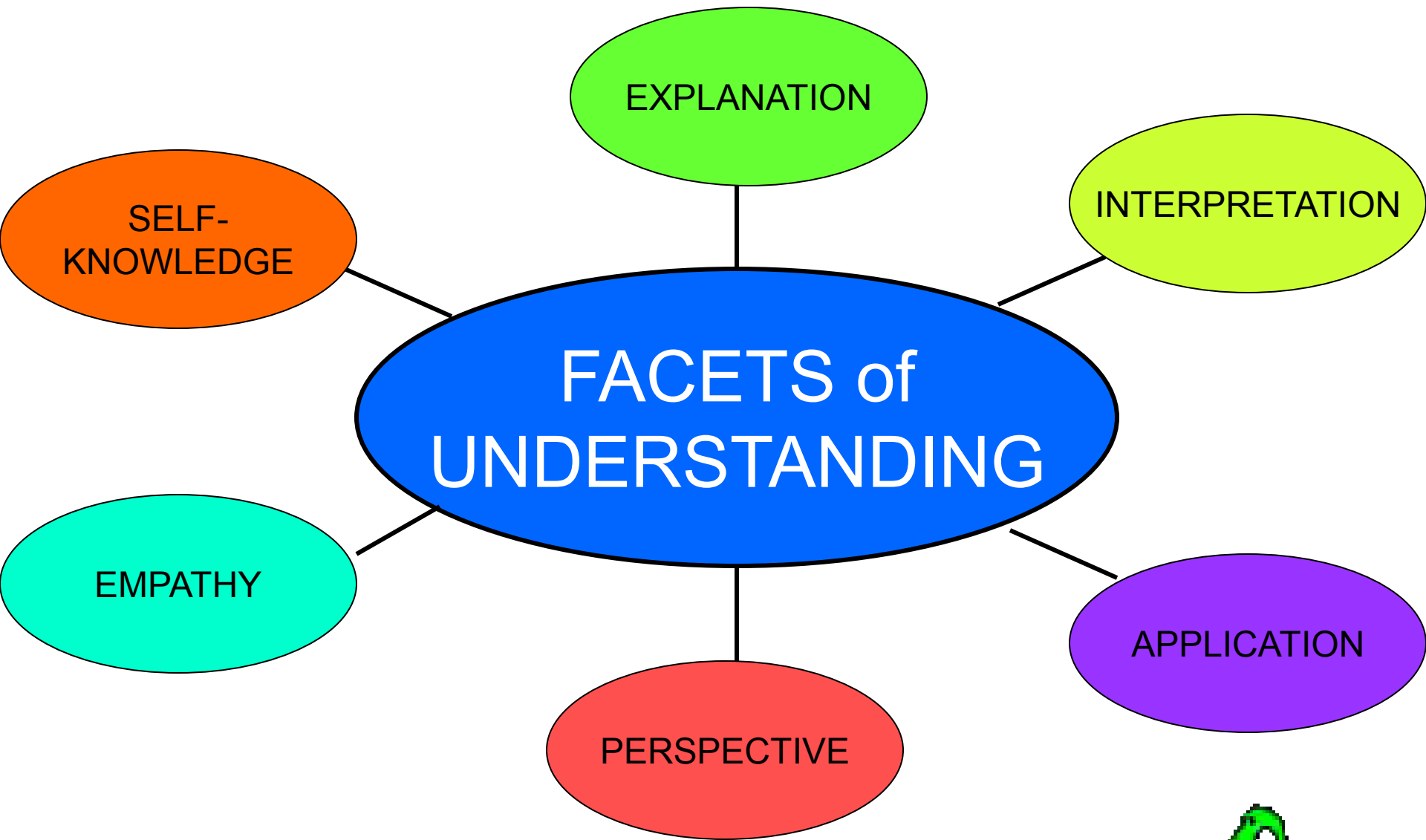
Topic	Big Idea/ Enduring Understanding	Essential Questions
<p>Physics</p>	<ul style="list-style-type: none"> •Without accurate and precise measurement, calculations even if done correctly are useless. •Machines are designed to make work convenient, either faster or easier. •Everyday people and objects move around you. •Forces are all around us, even if we dont see them. 	<ul style="list-style-type: none"> •How can accurate measurement lead to sound decision making? •How do simple machines have been essential in our society's technological advancement? •When do we say an object is moving? •How do we come to know about things we cant see?



Stage 2: Assessment Evidence

- ◆ Facets of Understanding provide a framework for building appropriate assessment tasks.
- ◆ Should be as faithful as possible to real world contexts, demands, and purposes.
- ◆ Must be assessed using valid criteria and indicators reflective of not only quality performance but related to the Desired Results of Stage 1.





Performance Verbs Based on Facets of Understanding

Explain	demonstrate, derive, describe, design, exhibit, instruct, justify, model, predict, prove, show, teach
Interpret	critique, document, evaluate, illustrate, judge, make sense of, represent, tell a story of,
Apply	adapt, build, create, decide, invent, perform, produce, propose, solve, test, use
Perspective	analyze, argue, compare, contrast, criticize, infer
Empathy	assume role of, believe, be open to, consider, imagine, role-play
Self-Knowledge	Be aware of, realize, recognize, reflect, self-assess



TOPIC: ENERGY TRANSFER

EXPLAIN: Describe how energy is transferred efficiently in the homes, school, and place.

INTERPRET: Evaluate why there are different power ratings of electrical appliances and relating these to the efficient use of energy.

APPLY: Proposing ways to efficiently use energy and its alternative sources.

PERSPECTIVE: Infer how proposed ways to minimize energy wastage contribute to the global campaign on the efficient use of energy.

EMPATHY: Assuming the role of a policymaker who develops measures for the efficient use of alternative energy sources and standard energy-compliant appliances/ vehicles.

SELF-KNOWLEDGE: Identifying one's habits which do not contribute towards efficient use of energy and be able to do concrete steps to correct these.

TOPIC: PHOTOSYNTHESIS



EXPLAIN: Explain the role of photosynthesis in agriculture.

INTERPRET: Represent the flow of energy in the form of collage.

APPLY: Perform a skit that shows the movement of electrons.

PERSPECTIVE: Conduct thought experiments: What would the world be if there will be no photosynthesis?

EMPATHY: Imagine that you are a plant in an extreme environment (drought/flooded). Write a reflective essay in this condition.

SELF-KNOWLEDGE: Journal writing: Realize one's contribution to environmental protection and conservation of resources.



Goal: the challenge statement in the scenario

Role: the role the student plays in the scenario

Audience: the audience/ client that the student must be concerned with in doing the task.

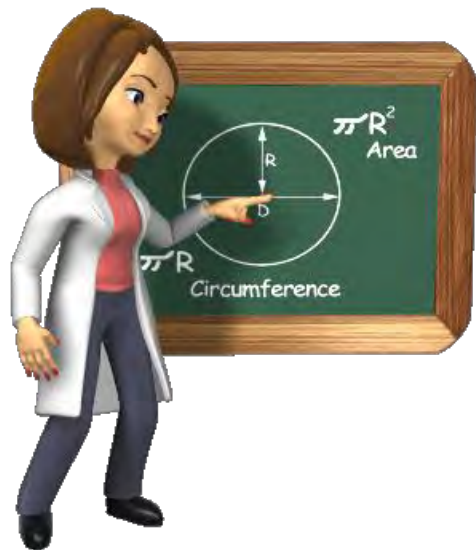
Situation: the particular setting/ context and its constraints and opportunities.

Performance: the specific performance or expected product.

Standards: trait or criteria by which the work will be judged.

Stage 3: Learning Plan

- ◆ focus is “aligned” learning activities.
- ◆ requires students be given numerous carefully-designed opportunities to draw inferences and make generalizations themselves.
- ◆ can be helpfully thought through in terms of WHERE TO



Where is the unit headed?



Hook the learner with engaging work.

Equip for understanding, experience, and explore the big ideas.

Rethink opinions, revise ideas, and work.

Evaluate your work and adjust as needed.

Tailor the work to reflect individual needs, interests, styles.

Organize the work flow to maximize in-dep understanding and success of summative

Examples of Performance Tasks:

TOPIC: Weather and Climate

You are a meteorologist working for local news. The show will air in 10 min with the weekend's forecast, but all the equipment is failing. Use what you know about patterns in global and local weather to predict upcoming weather for your community.

Role-play the part of meteorologist and verbally present your forecast predictions and your reasoning to the audience.

TOPIC: Circulatory System

Your father, a cardiologist, has asked you to help out in his medical mission. He has asked you to prepare a Poster or Bulletin Board display about how the heart works, its importance, some diseases of the heart that are prevalent today and their causes, and how one can take care for the heart. You will be using the Poster to teach the children in the outreach community about the heart so that they can teach the adults in their family about the circulatory system.


Examples of Performance Tasks:

TOPIC: Chemical Reaction

There was an explosion of sulfuric acid tank in a nearby community. Firefighters pump huge amounts of water onto the area to extinguish the fire and knock down a cloud of sulfuric acid mist that escaped when the tank ruptured. Hazardous materials crews work through the night to neutralize the chemicals at the fire site.

Being an environmental journalist, prepare a news article that will present current uses of sulfuric acid and the hazards associated with the use of sulfuric acid in these industries. Also provide an overview of safety precautions these industries take to avoid accidents such as the one described in the scenario.

TOPIC: Forces

You are a health consultant asked whether ascending and descending from a high rise building riding an elevator affects employee's health. You will determine how does a person's weight vary as he/she ascend and descend in an elevator from at least a minimum of 10 floors and a minimum of 6 times a day (3 times ascending 3 times descending). You will do this by placing a weighing scale under  at while you are on board the elevator as it ascend and descend.

Possible Products and Performances:

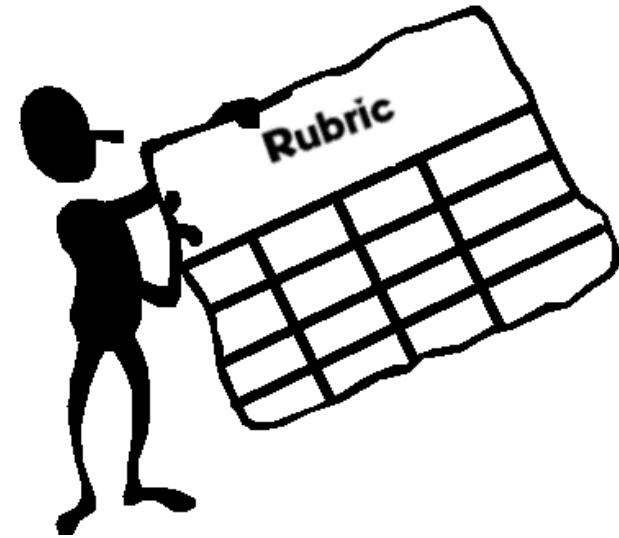
Written	Oral	Visual
Advertisement	Audiotape	Advertisement
Book report	Conversation	Banner
Brochure	Debate	Cartoon
Collection	Discussion	Collage
Essay	Dramatization	Diagram
Experiment record	Interview	Diorama
Journal	Oral report	Display
Laboratory report	Poetry reading	Drawing
Letter	Puppet show	Flyer
Newspaper article	Radio script	Game
Play	Rap/Flip top	Graph
Poem	Speech	Model
Web site	Skit	Photograph
	Song	Powerpoint
	Teach a lesson	Scrapbook
		Video Presentation



Sample Rubric:

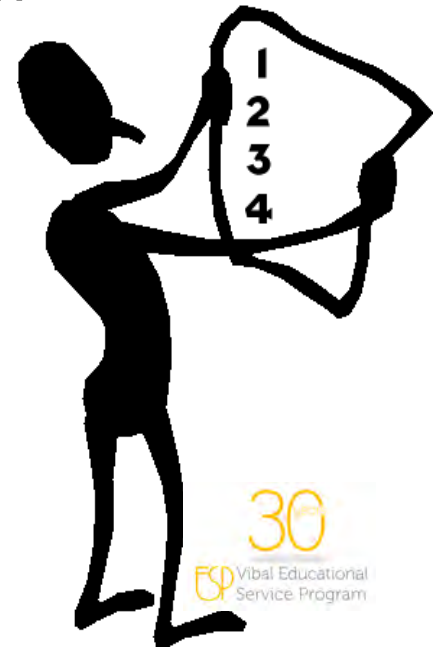
For Brochure:

- Accuracy of information
- Creativity of presentation
- Proper documentation of sources
- Neatness



For Photodocumentation:

- Richness/Variety of photos
- Correctness of accompanying explanation
- Creativity or Quality of Photos
- Neatness



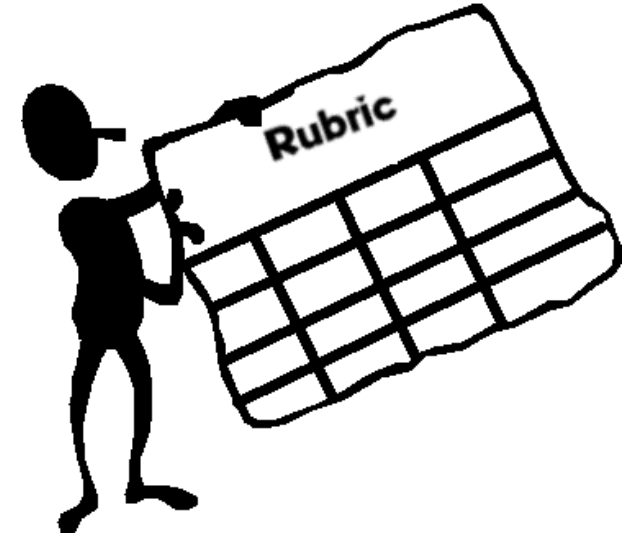
For Interview:

- Richness/Accuracy of information
- Clarity of organization of results
- Creativity of Presentation
- Individual participation in group effort

Sample Rubric:

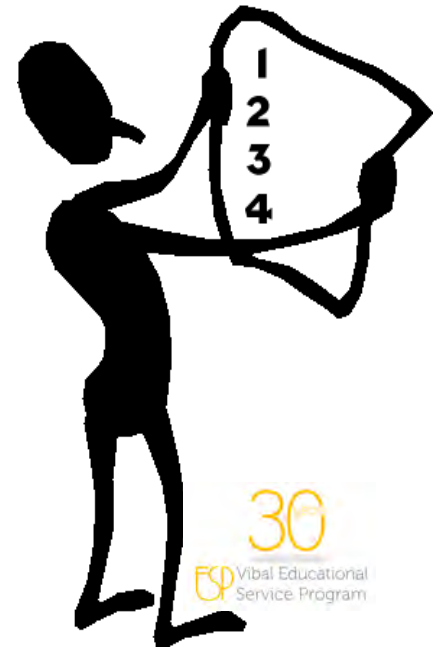
For Poster:

Graphics-Clarity
Labels
Information
Title
Grammar
Attractiveness



For Model:

Design and Development
Accuracy
Participation
Functionality
Promptness



Rubric Sites:

<http://rubistar.4teachers.org>

<http://www.4teachers.org>

http://www.teach-nology.com/web_tools/rubrics/

