

The Bennett TOP Model: A Tool to Characterize Environmental Literacy Program Performance, National Marine Sanctuaries Case Study



**Proposal to the NOAA Education Council (Part II)
May 16, 2007**



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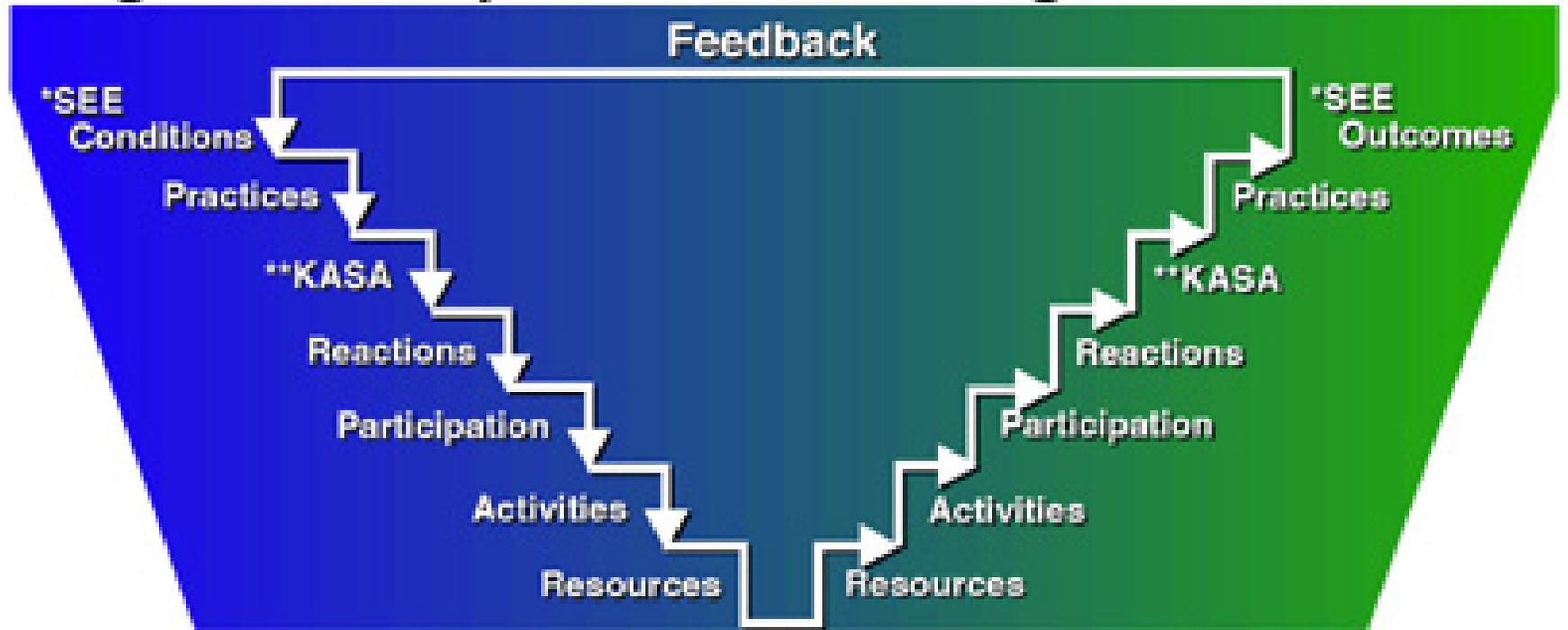
Bennett's TOP Model

(Targeting Outcomes of Programs)

Program Development

Program Performance

Feedback



***SEE**

S = Social

E = Economic

E = Environmental

****KASA**

K = Knowledge

A = Attitudes

S = Skills

A = Aspirations



Methods of Application



- Program Level Applications / Inventory / Characterization
 - Method 1: Using the framework as a descriptive tool to characterize programmatic effectiveness based on evaluation efforts of individual activities/projects in it diverse portfolio. (Descriptive Tool)
 - Method 2: Using the framework as a proscriptive tool to characterize the overall effectiveness of a diverse portfolio of activities/projects along a suite of commonly accepted programmatic outputs and outcomes. (Proscriptive Tool) / Cross-site Analysis / Evaluation



Case Study: National Marine Sanctuaries

- Assessed program-wide education/outreach goal: “To inspire ocean literacy and conservation through national marine sanctuaries.”
 - Emphasis: human / ocean interconnection (Ocean Literacy Essential Principle #6)
 - Emphasis: “action” education / conservation behavior
- Adopt Bennett’s TOP Model as logic model framework.
 - Allows use of other environmental education evaluation models



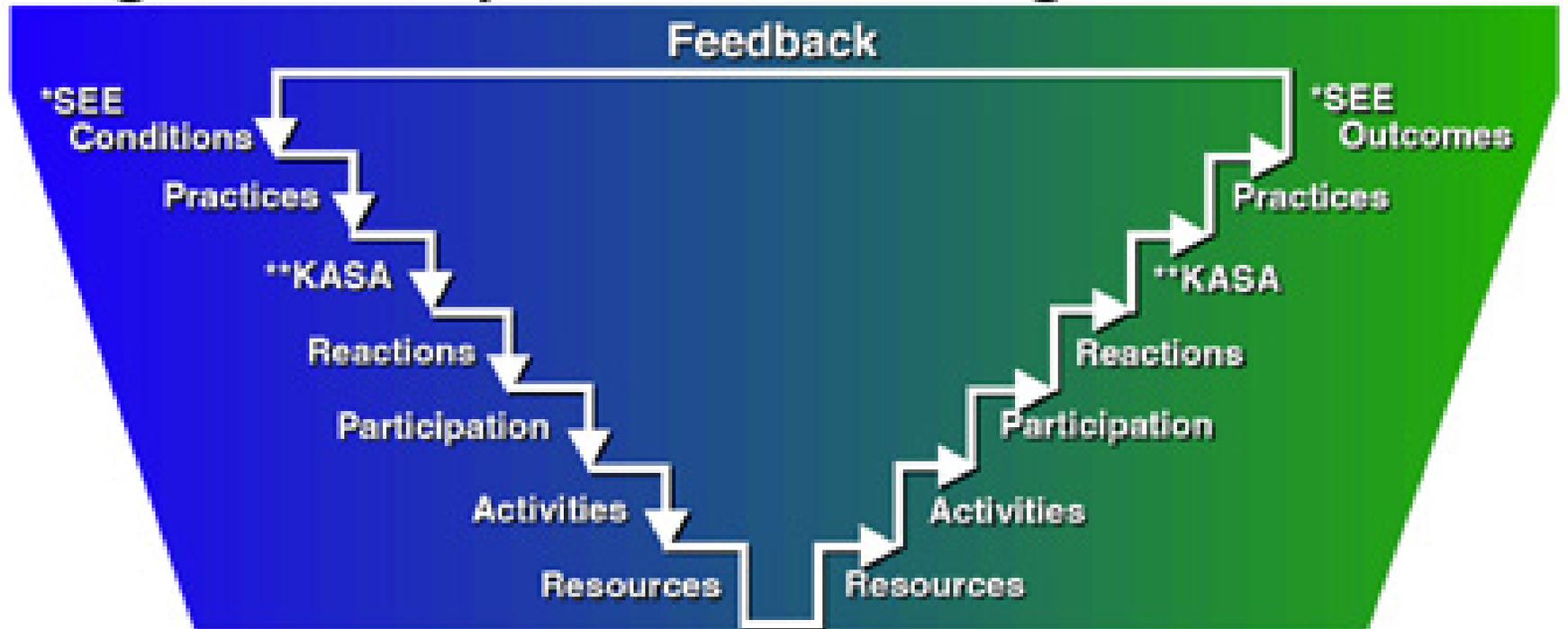
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Wiggins & McTighe

Understanding by Design

Identify
Desired
Results

What should students know, understand, & be able to do? What is worthy of understanding? What enduring understandings are desired?

Determine
Acceptable
Evidence

How will we know if the students have achieved the desired results & met the standards? What will we accept as evidence of student understanding & proficiency?

Plan Learning
Experience &
Instruction

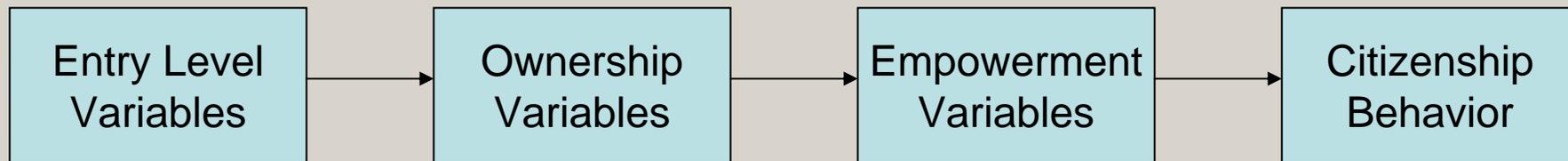
What knowledge & skills will the students need to achieve the desired results? What activities will equip the students with the needed skills? What will need to be taught..., what materials & resources are required to meet the desired goals?

Adapted from <http://digitalliteracy.mwg.org/documents/process.pdf>, Retrieved April 16, 2007



Hungerford & Volk Model

Changing Learner Behavior Through Environmental Education



ENTRY LEVEL

Major Variables

- Environmental Sensitivity

Minor

- Knowledge of ecology
- Androgyny
- Attitudes toward pollution, technology, and economics

OWNERSHIP

Major Variables

- In-depth knowledge about issue
- Personal investment in issues and the environment

Minor

- Knowledge of the consequences of behavior- both positive and negative
- A personal commitment to issue resolution

EMPOWERMENT

Major Variables

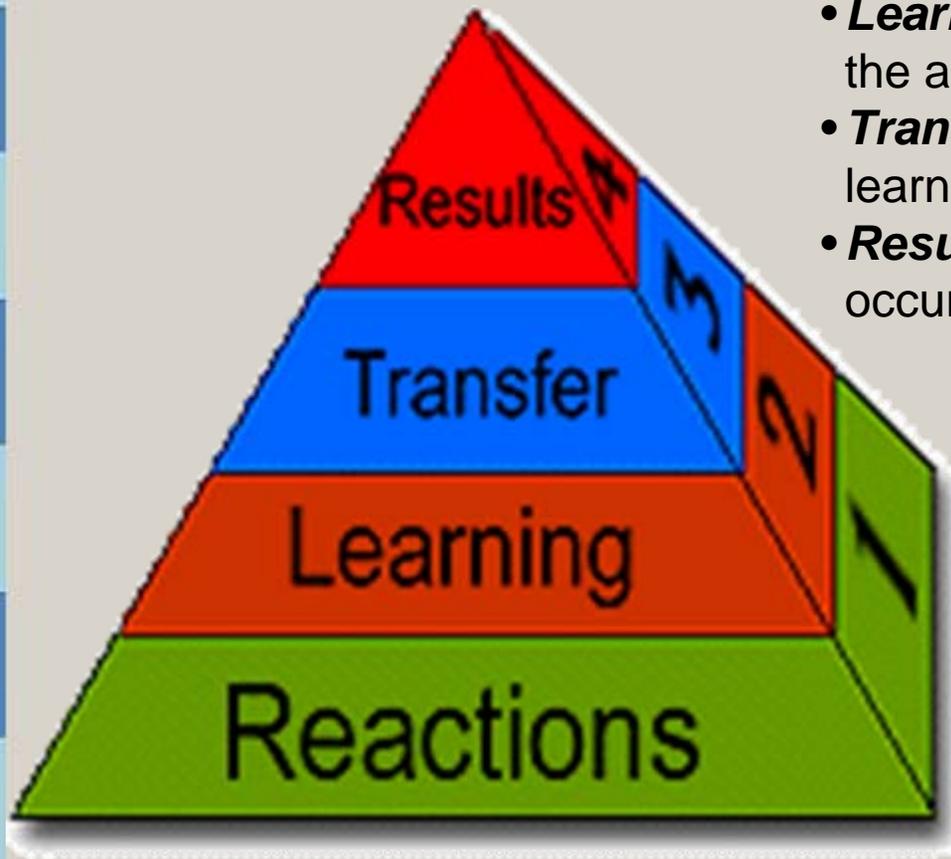
- Knowledge of and skill in using environmental action strategies
- Locus of control (expectancy of reinforcement)
- Intention to act

Minor

- In-depth knowledge



Kirkpatrick's Evaluation Model



- **Reactions:** Was the participant satisfied with the activity? Did the participant complete it?
- **Learning:** What did the participant learn from the activity?
- **Transfer:** How did the participant transfer the learning into their own life or experiences.
- **Results:** Did the desired improvements occur?

Winfrey, E.C. (1999). Kirkpatrick's Four Levels of Evaluation. In B. Hoffman (Ed.), *Encyclopedia of Educational Technology*. Retrieved April 16, 2007, from <http://coe.sdsu.edu/eet/articles/k4levels/start.htm>



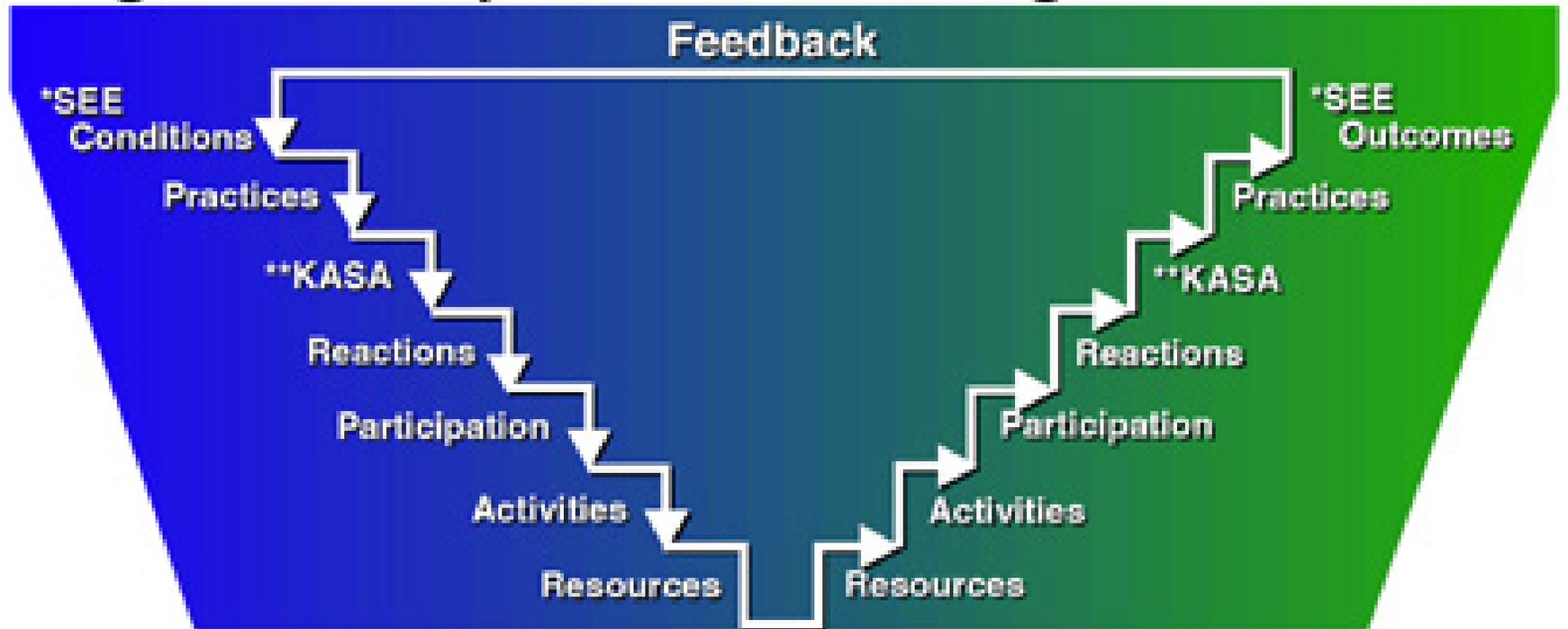
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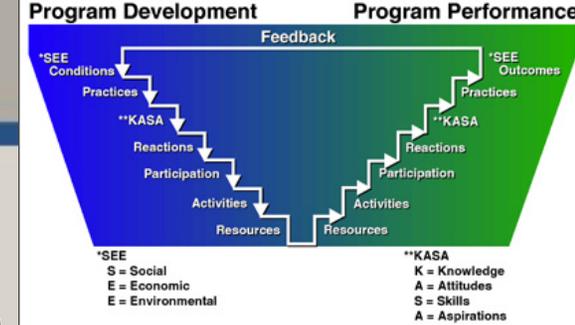
A = Aspirations



Level 7: Resources

Time, money and staff (human and financial resources) used to plan, design, develop, implement, and evaluate programs.

- How many and what kind of paid employees?
- What percentage of their workload?
- How many volunteers?
- How much money raised from outside sources?
- Other kinds of contributions to the program?
- How much money will come from your organization?
- Total budget for the program?





Level 7: Resources

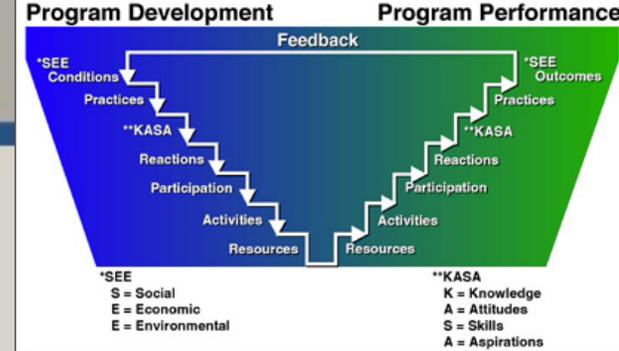


Time, money and staff (human and financial resources) used to plan, design, develop, implement, and evaluate programs.

- Record human contributions from within organization: total number of federal and contract labor hours (paid) for project; estimate hourly wage. Total number of volunteer hours; estimate volunteer hourly wage.
- Record human contributions from outside organization.
- Record monetary contributions: from organization, outside of organization.
- Record other contributions to the program.
- Record total budget.



Level 6: Activities



Various educational steps, activities and events used to bring the program to life.

- What activities are you planning?
- What will participants do at activities?
- What events must occur to prepare for the actual program activities?
- When will these events and activities occur?
- What external factors will affect the success of these activities (holidays, weather, competing events, cooperation from a third party, etc.)?



Level 6: Activities

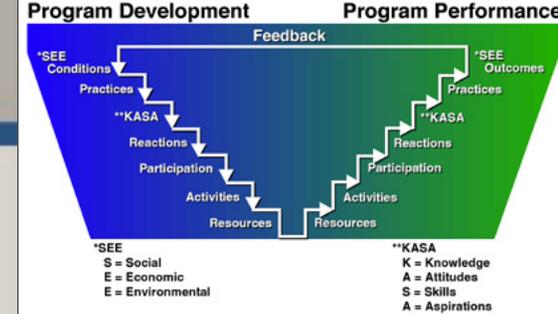


Various educational steps, activities and events used to bring the program to life.

- Categorize (by percent) education/outreach activities/events (pull-down menu): professional development, workshops, scholarships, training, lectures, field studies, curriculum development, etc.
- Quantify events (for example, 3 workshops).
- Describe in one paragraph precisely what will occur during the program.



Level 5: Participants



A specific set of individuals who actually participate in the program.

- What is the target audience (be very specific)?
- What cultural, social or demographic characteristics do members of this audience share with one another?
- What is the most effective way to publicize the program in order to recruit participation?
- How many participants do you expect/desire?
- What (and how many) products will you produce?
- Who will participate in technical review capacity to represent the target audience's unique perspective?



Level 5: Participants

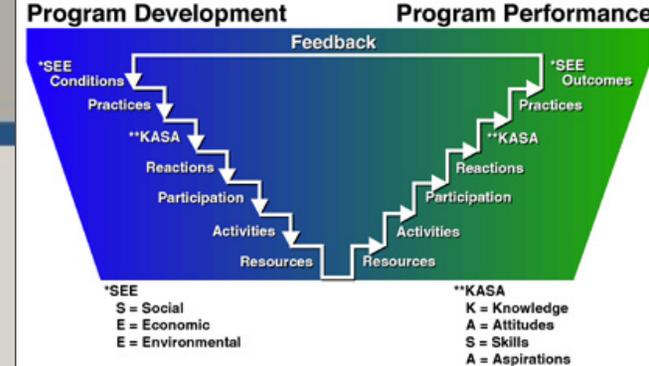


A specific set of individuals who actually participate in the program.

- Record the number of participants (if educator, record annual direct contact with students).
- Record the characteristics of your audience (for example, recreational boaters operating from Sandy Point marina).
- List products developed (and quantity distributed).



Level 4: Reactions



Participants' degree of positive or negative interest in topics addressed, their acceptance of activity leaders, and their attraction to the educational methods.

- How do project participants view your organization?
- How do participants feel about their instructors?
- How do participants feel about the project?
- How do participants feel about the environment after being involved in the project?



Level 4: Reactions

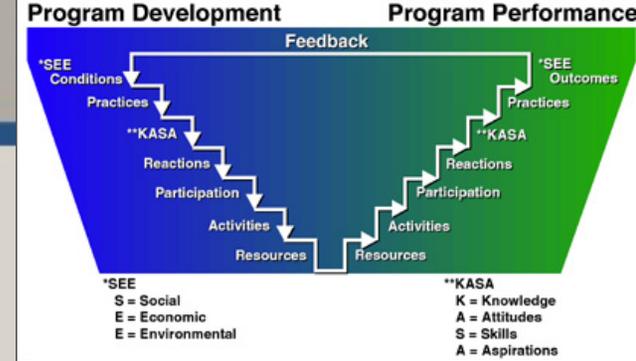


Participants' degree of positive or negative interest in topics addressed, their acceptance of activity leaders, and their attraction to the educational methods.

- **Attitudes:** Spending time in nature is important to me; Learning about nature is important to me; I like learning about nature. (Selections from Gotch & Hall, 2004)
- **Environmental Values:** I really enjoy nature; I would like to volunteer my time to help nature; People have the right to change nature whenever they need to. (Selections from Zimmerman, 1996)
- **Environmental Apathy:** I don't care about environmental problems; I need time in nature to be happy; I prefer (marine sanctuaries) to aquariums. (Selections from Thompson & Barton, 1994)
- **Place Dependence:** I am very attached to this place; I identify strongly with this place. (Selections from Vaske & Kobrin, 2001)
- **Organizational prestige:** I selected this (workshop) based on the reputation of the organization/instructor; This (workshop) met my needs; The information presented was clear and well-organized; This (workshop) should be repeated. (Selections from NSTA conference evaluations)



Level 3: Knowledge, Attitudes, Skills & Aspirations



Knowledge, Attitude, Skills, and Aspirations that influence the adoption of selected practices and technologies to help achieve targeted social, economic, and environmental outcomes: knowledge acquired, skills mastered, changes in attitudes and aspirations

- Does a change of behavior require new knowledge or skills that can be learned or new attitudes or awareness levels that must be developed?
- What kinds of information are required for learning?
- What are the specific learning objectives of the program?
- How will information be transmitted to program participants?
- How will you determine if participants have received, understood, or used knowledge, attitudes, skills, awareness?



Level 3: Knowledge, Attitudes, Skills & Aspirations



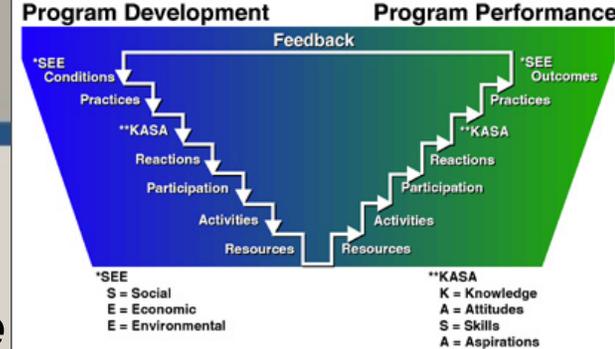
Knowledge, Attitude, Skills, and Aspirations that influence the adoption of selected practices and technologies to help achieve targeted social, economic, and environmental outcomes: knowledge acquired, skills mastered, changes in attitudes and aspirations

- **Identity & Natural Environment** questions: I am willing to engage in saving the living area and conditions of the ocean; I am responsible for protecting the ocean. (Selections from Kals & Ittner, 2003)
- **Children's Environmental Attitudes & Knowledge** Scale: I would give \$15 of my own money to help protect wild animals; I do not worry about environmental problems. (Selections from Leeming, Dwyer & Bracken, 1995)
- **Environmental Identity** Scale: Engaging in environmental behaviors is important to me; If I had enough time or money, I would certainly devote some of it to working ofr environmental causes; Learning about the natural world should be an important part of every person's upbringing. (Selections from Clayton, 2003)
- **Content questions** (examples): Where does water that flows into a street storm drain end up? Which of the following statements best describes a watershed?



Level 2: Practices

*Patterns of behaviors, procedures, or actions that influence **S**ocial, **E**conomic or **E**nvironmental condition that causes resource problem.*



- What current behavior (or lack thereof) on the part of the target audience contributes to the existing condition?
- What changes in behavior do you hope will occur as a result of the program?
- How will you know if the behavior of project participants has changed as a result of the program?
- Do you plan any follow-up activities to determine or estimate long-term changes in the behavior or the target audience?



Level 2: Practices

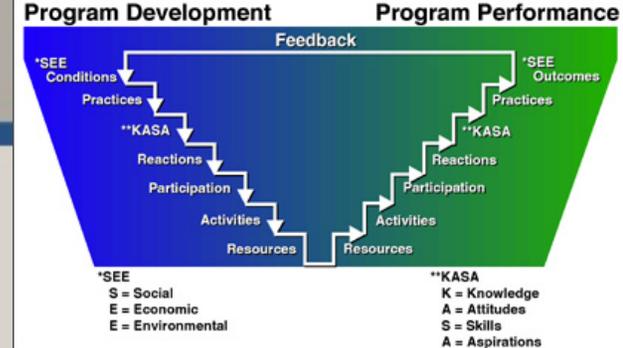


*Patterns of behaviors, procedures, or actions that influence **S**ocial, **E**conomic or **E**nvironmental condition that causes resource problem.*

- **Behavior, Behavioral Intentions:** How often do you plan to do each activity in the future (go outside in nature; watch wildlife; read a newspaper or magazine article about nature; volunteer to help nature with your school, church, community club; talk about nature with your friends or family;)? (Selections from Gotch & Hall, 2004)
- **Environmentally Responsible Behaviors:** How often have you (tried to learn what you can do to help solve environmental issues; talked with others about environmental issues; tried to convince friends to act responsibly toward the environment)? (Selections from Vaske & Kobrin, 2001)
- **Teaching Behaviors:** Has your participation in (this workshop) changed how you will teach in any of the following ways: allow students to investigate a local environmental issue through their own or an ongoing project; enable students to engage in environmental actions related to ocean/coast/watershed issues; allow students to contribute in some way to the betterment of their community through their own or an ongoing project?



Level 1: SEE Outcomes



*Improvements to **S**ocial, **E**conomic or **E**nvironmental conditions that decrease threats to resource.*

- What present environmental condition will the program help correct?
- Describe the situation once that condition has been corrected.
- How will you know if the condition has been corrected?
- How will your program contribute to correcting the condition?



Level 1: SEE Outcomes



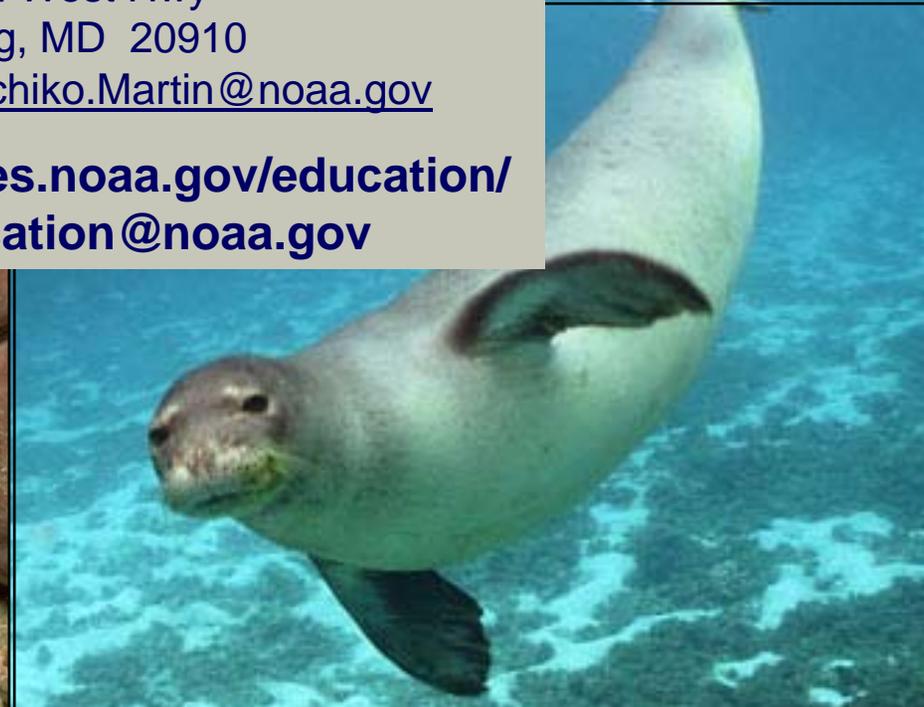
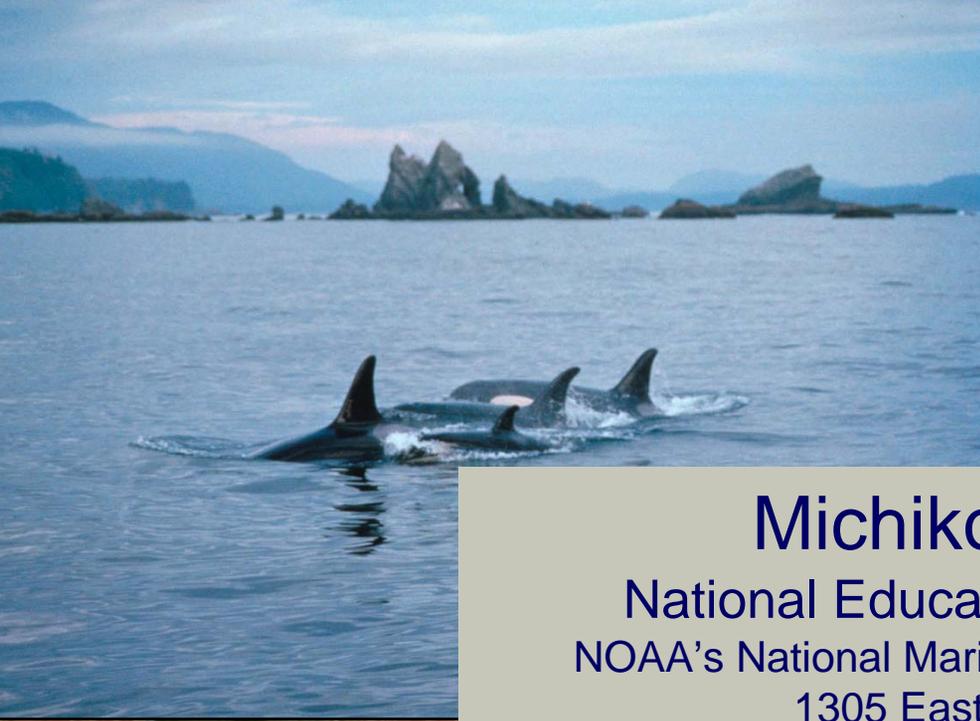
*Improvements to **S**ocial, **E**conomic or **E**nvironmental conditions that decrease threats to resource.*

- Characterize the environmental condition prior to intervention (quantify, if possible; for example, pollution index).
- Characterize the environmental condition after intervention (quantify, if possible).
- List improvements to SEE conditions that directly result from intervention
- Quantify improvements to SEE conditions that directly result from intervention (for example, % increase in recycling behavior; % increase in teachers bringing ocean conservation issues into classrooms; % increase in economic incentives to adopt ocean etiquette guidelines)



Case Study: National Marine Sanctuaries (continued)

- Adoption of NMSP evaluation toolbox and pilot testing.
- Training of Education Coordinators and staff in use of toolbox.
- Systematic evaluation of all NMSP-funded education / outreach programs.



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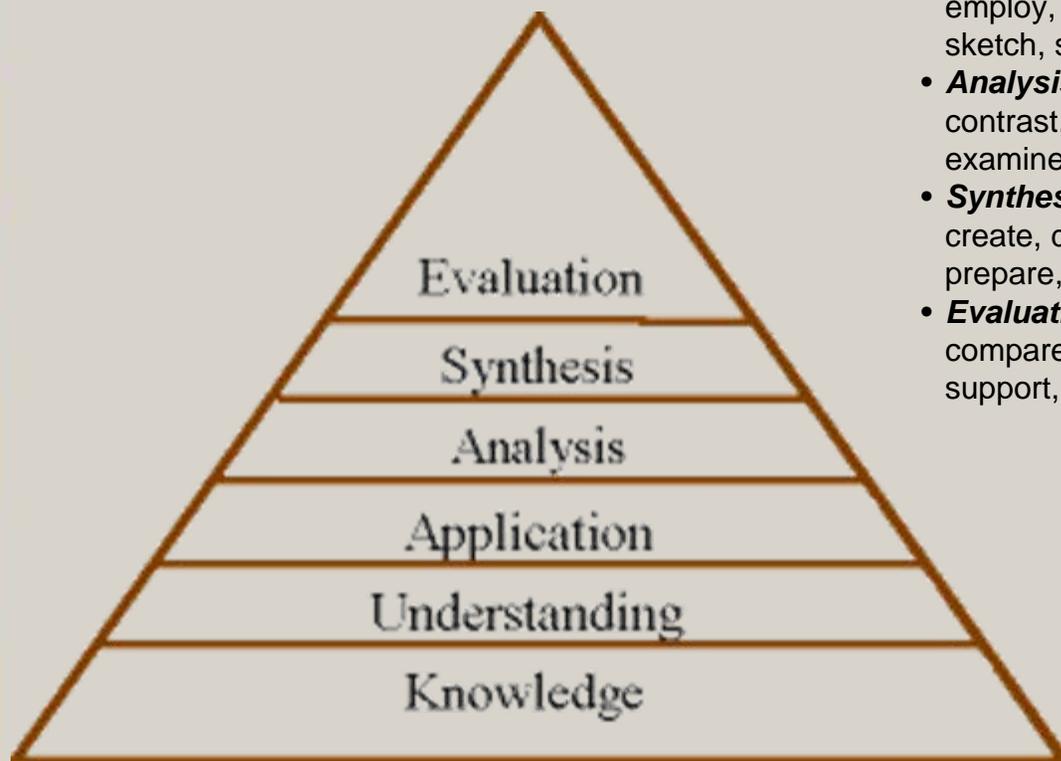
Frank and Joyce B



BACK UP SLIDES



Bloom's Taxonomy



- **Knowledge:** arrange, define, duplicate, label, list, memorize, name, order, recognize, relate, recall, repeat, reproduce state.
- **Comprehension:** classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, restate, review, select, translate,
- **Application:** apply, choose, demonstrate, dramatize, employ, illustrate, interpret, operate, practice, schedule, sketch, solve, use, write.
- **Analysis:** analyze, appraise, calculate, categorize, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test.
- **Synthesis:** arrange, assemble, collect, compose, construct, create, design, develop, formulate, manage, organize, plan, prepare, propose, set up, write.
- **Evaluation:** appraise, argue, assess, attach, choose compare, defend estimate, judge, predict, rate, core, select, support, value, evaluate.

Adapted from <http://www.officeport.com/edu/blooms.htm>, Retrieved April 16, 2007



Option 3: Preferred Alternative



The Education Council endorses TOP as an appropriate framework for structuring and aggregating data on environmental literacy activities across NOAA and continues to explore its application and implementation.

- PROS

- Offices, programs, goals... will have guidance, assistance and support to develop approaches for meeting their requirements for performance data.
- Performance metrics and data will be addressed in a proactive/consistent fashion across NOAA E-Lit activities.
- NOAA will have a common framework for discussing, collecting, and reporting the impact of aggregate E-Lit activities at all applicable levels across relevant outputs or outcomes

- CONS

- Requires broad collaborative commitment
- OEd staff support, program designs, and future funding priorities may need to be realigned to support implementation



Level 3: KASAs



KASA: Knowledge, Attitude, Skills, and Aspirations that influence the adoption of selected practices and technologies to help achieve targeted social, economic, and environmental outcomes. Changes in KASA can occur when people react positively to their involvement in program activities.

- **Knowledge:** Learned information, accepted advice, awareness, understanding, and/or problem solving ability; it also includes comprehending economic, social, and environmental principles, and comprehending individual and group decision-making processes.
- **Attitudes:** Individuals' beliefs, opinions, feelings, perspectives, outlooks, or viewpoints .
- **Skills:** Individuals' mental and physical abilities to use new or alternative practices; verbal or physical abilities, new skills or improve performance.
- **Aspirations:** Ambitions, hopes, objectives, behaviors, or desires.