Assessment & Evaluation

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Assessment vs Evaluation

- Assessment – to determine what individuals have gained from an experience
- Evaluation – to judge the effectiveness of an program
- Research – to contribute to a body of knowledge

Types of Evaluation & Assessment

- Front-end
  - Needs assessment
  - Baseline data
  - Audience analysis
- Formative
  - Implementation
  - Process
- Summative (or outcome)

Why Include a Chapter on A & E?

- To encourage the development of quality activities/curricula/professional development
- To increase impact
- To increase likelihood of use of above resources
- To increase likelihood of successful grant writing
- To be ethical

Assessment vs Evaluation

Assessment	Evaluation
Learning Objectives (what to measure) Link to Next Generation Science Standards Common Core or state standards "Strands" of science learning Other	**Metrics (Outputs, Outcomes, Impacts)** May include those to the left, but more broadly defined
Tools (how to measure) Objective tests Fill-in-the blank worksheets Drawings, models, and maps Concept maps Essays Oral presentations Projects Observation	**Tools (how to measure)** Standardized instruments (e.g., scales) Interviews Focus groups Questionnaires Website analytics Observation Project records

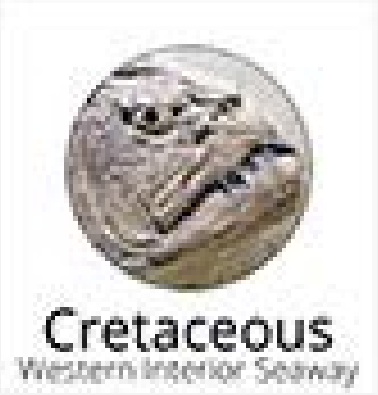
NSF FRAMEWORK CATEGORY	LSIE STRANDS
Knowledge, awareness, understanding: Measurable demonstration of assessment of, change in, or exercise of awareness, knowledge, understanding of a particular scientific topic, concept, phenomena, theory, or career central to the project.	**Understanding** (Strand 2): Come to generate, understand, remember, and use concepts, explanations, arguments, models, and facts related to science.
Engagement, interest, or motivation in science: Measurable demonstration of assessment of, change in, or exercise of engagement/interest in a particular scientific topic, concept, phenomena, theory, or career central to the project.	**Interest** (Strand 1): Experience excitement, interest, and motivation to learn about phenomena in the natural and physical world.
Skills related to science inquiry: Measurable demonstration of the development and/or reinforcement of skills, either entirely new ones or the reinforcement, even practice, of developing skills.	**Science Exploration** (Strand 3): Manipulate, test, explore, predict, question, and make sense of the natural and physical world.
Attitudes toward science: Measurable demonstration of assessment of, change in, or exercise of attitude toward a particular scientific topic, concept, phenomena, theory, or career central to the project or one's capabilities relative to these areas. Attitudes refer to changes in relatively stable, more intractable constructs such as empathy for animals and their habitats, appreciation for the role of scientists in society, or attitudes toward stem cell research, for example.	**Identity** (related to Strand 6): Think about themselves as science learners, and develop an identity as someone who knows about, uses, and sometimes contributes to science. Also related to Strand (4), Reflection: Reflect on science as a way of knowing; on processes, concepts, and institutions of science; and on their own process of learning about phenomena.
Behavior: Measurable demonstration of assessment of, change in, or exercise of behavior related to a STEM topic. Behavioral impacts are particularly relevant to projects that are environmental in nature because action is a desired outcome.	**Skills** (related to Strand 5): Participate in scientific activities and learning practices with others, using scientific language and tools.

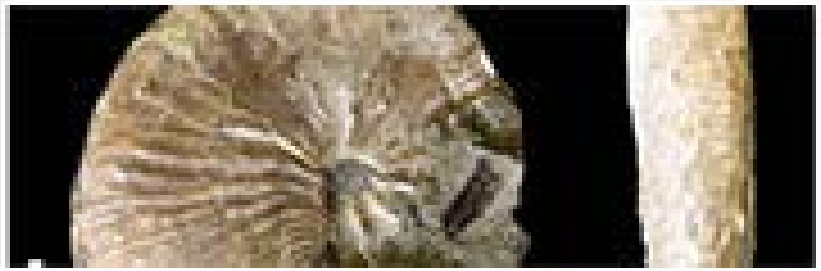
What Are We Assessing/Evaluating?

- Activities accomplished in a single session
- Multi-day classroom activities
- Curriculum units
- Specimen galleries
- Data portals
- Professional development (single/multiple sessions)

Digital Atlas of Ancient Life

Digital Atlases Online Now





Project Updates

Cretaceous Atlas of Ancient Life now online!

Notes from Nature

A & E Varies by Activity/Resource

Resource	Form Ass	Summ Ass	Front End	Form Eval	Sum Eval	Res Design
Single Day		X				
Multi-Day	X	X				
Curr	X	X		X	X	
Spec Gall						
Data Port						
Prof Dev	X	X	X	X	X	X

Main Points

- Clearly define goals and objectives
- Select a measure appropriate to developmental level and context
- Ensure the measure aligns with the objectives
- Use reliable and valid measures
- Research may require additional rigor

Resources

- NSF 2010 User-Friendly Guide for Project Evaluation

  http://nsf-i3.org/resources/view/the_2010_user-friendly_handbook_for_project_evaluation
- NSF User-Friendly Handbook for Mixed Method Evaluations

  http://www.nsf.gov/pubs/1997/nsf97153/
- Online Evaluation Resource Library (OERL) for NSF's Directorate for Education and Human Resources

  http://oerl.sri.com/home.html
- NSF Common Guidelines for Education Research and Development

  https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13126

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  http://oerl.sri.com/home.html
- Field-tested Learning Assessment Guide (FLAG) for STEM Instructors

  http://www.flaguide.org/
- Assessment Tools in Informal Science (ATIS)

  Pearweb.org/atis

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Identify Clear Goals

NGSS Lesson Planning Template

Grade/ Grade Band: 7th	**Topic:** Biological Evolution: Unity and Diversity	**Lesson # _____ in a series of _____ lessons**
Brief Lesson Description:		
Performance Expectation(s): **MS-LS4-1** - Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. **MS-LS4-2** Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.		
Specific Learning Outcomes: Students will use mathematical and computational thinking to construct a model of an ancient dragonfly based upon the insect fossil record in the iDigPaleo database.		

From iDigPaleo Dragonfly Model lesson (draft)