NASA Science Mission Directorate:
Earth and Space Science Education Products Review

Informal Education Review Form

This review form was designed for evaluating NASA educational products intended for informal education audiences. These products are intended to be used to promote learning by audiences outside of the formal school settings or as content/resources for informal educators developing such programs, e.g. products designed for museums, planetariums, afterschool programs, youth programs, science clubs, etc. Examples of products include educational games, planetarium shows, interpretive program guides, activity guides, etc..

General Instructions:

- Complete one form for each resource that you are evaluating.
- Please evaluate the materials based upon the following scale, in response to the criteria provided.

Outstanding	or	Numerous examples/evidence consistently found throughout the materials.
Very Good	or	Numerous examples/evidence found in some components of the materials
Good	or	Some examples/evidence consistently found throughout the materials.
Fair	or	Some examples/evidence found in some components of the materials.
Poor	or	Little or no examples/evidence found in the materials.

- All of the examples provided for each criterion may not apply to a product (and are not required to apply to every product). Examples are not presented in rank order, but are alphabetized so that you can easily refer to specific items (e.g., "regarding a., this product…")
- Check the appropriate rating next to each criterion.
- Reviewer notes should be written in the space following each criterion. Extra pages may be added if needed. Please be as specific as possible.
- Note the rating for each criterion and provide an overall assessment on the summary page (next to last page).
- Provide your overall recommendation on the "Recommendation" page (last page).

Resource Title: _____ **No.**_____

Criterion 1: Materials are appropriate, complete, and effectively presented for the target audience.

Rating: ❑ Outstanding ❑ Very Good ❑ Good ❑ Fair ❑ Poor

{The following are given as a range of examples. Not all examples are expected to be addressed in every product. Do not use these suggestions as a checklist.}

a. Materials are appropriate for the age, grade, and maturity of the target audience and/or as resources/content for educators at informal education venues or programs (e.g., museums, planetariums, science outreach programs, visitor centers, youth and community outreach programs, science clubs, or the general public at these venues).
b. Current, up-to-date information is provided.
c. Instructional or explanatory materials are effective and well-written; acronyms and terms are clearly explained; information is presented in a logical and organized manner, answers are provided to all specific questions asked.
d. Graphs, charts, images, and animations are clearly labeled/indicated/narrated, including color keys where appropriate, and information describing units of measurements that are used (e.g., what these units mean and how they compare to familiar examples), and clear distinctions between scientific data and simulated data/artist renditions.
e. Material is appropriately engaging, stimulating, and/or entertaining for the target audience where it can be used as supplement curriculum materials and/or as content for instructors and students, and/or used in museums, planetarium, science outreach programs, visitor centers, youth and community outreach programs, science clubs, or the general public.

Reviewer comments:

Criterion 2: Production/design quality is high.

Rating: ❑ Outstanding ❑ Very Good ❑ Good ❑ Fair ❑ Poor

{The following are given as a range of examples. Not all examples are expected to be addressed in every product. Do not use these suggestions as a checklist.}

NOTE: some products being reviewed may still be in an unfinished state so that recommendations from the education product review may be implemented along with final design.

a. Design seems effective, visually stimulating, and appealing (even if in a draft state).
b. Visuals/images are crisp, clear, and/or high-resolution.
c. Video/audio quality is high.
d. The material is free from production errors (e.g., misspellings, typos, grammatical and editorial errors).

Reviewer comments:

Criterion 3: If applicable, materials effectively integrate learning technologies.

Rating: ❑ Outstanding ❑ Very Good ❑ Good ❑ Fair ❑ Poor ❑ N/A

Note: It is not a requirement to integrate learning technologies; if a product doesn't, check "N/A."

{The following are given as a range of examples. Not all examples are expected to be addressed in every product. Do not use these suggestions as a checklist.}

Learning technologies may be used in the following ways:

a. to make measurements and perform calculations, e.g., probeware, hand-held data collectors, computers, and calculators.
b. to collect, organize, analyze, and present data, e.g., spread sheets and graphics packages.
c. to access and communicate information, e.g., telecommunications, Internet, databases, and word processing.
d. to explore and/or simulate complex relationships, e.g., modeling programs.
e. to develop conceptual understanding, e.g. CD-ROM, DVD and videos.

Reviewer comments:

Criterion 4: The content presented is accurate.

Rating: ❑ Outstanding ❑ Very Good ❑ Good ❑ Fair ❑ Poor

{The following are given as a range of examples. Not all examples are expected to be addressed in every product. Do not use these suggestions as a checklist.}

The product presents content accurately. Consider the following:

a. The material is free from content errors (e.g., scientific and mathematical inaccuracies, incorrect facts or statements, theory and fact are adequately distinguished).
b. The material addresses common misconceptions.
c. The metric system of weights and measures is consistently used (e.g., Celsius, grams, liters, meters) or metric equivalents are provided.

Reviewer comments:

Criterion 5: The product provides good and relevant references for further investigation/information.

Rating: ❑ Outstanding ❑ Very Good ❑ Good ❑ Fair ❑ Poor

This may consist of one, high-quality, relevant Website, or a wide range of materials and sites as appropriate for this product type or delivery method.

Reviewer comments:

Criterion 6: The product is easy to use and free from technical difficulties.

Rating: ❑ Outstanding ❑ Very Good ❑ Good ❑ Fair ❑ Poor ❑ N/A

{The following are given as a range of examples. Not all examples are expected to be addressed in every product. Do not use these suggestions as a checklist.}

For technology-based products, consider the following:

a. The user interface is easy-to-understand.
b. Instructions are easy-to-follow, clear, and complete.
c. The product is quick loading, user friendly, well organized, and structured.
d. Ease of navigation: not too many levels to click through, easy to move forward, backward, and "escape" easily (e.g., back to the home page, to quit, etc.), and updates are easy to find.
e. Documentation and any technical requirements for using the resource are specified.
f. The product is free from technical difficulties (e.g., doesn't freeze, no error messages, links to WWW sites are up-to-date).
g. Where appropriate, useful online help is provided.
h. Text and graphics are appropriate for the content: for example, on WWW sites image files load quickly, text is legible, background does not interfere with reading.

- Appropriate tools are provided for using the product (e.g., suggestions for the classroom, links to needed software, education standards are identified, etc.)

Reviewer comments:

Criterion 7: Does the site require parents' permission before collecting personal information from children younger than 13?

Web sites for children under 13 that collect personal information from children **or** general audience Web sites that collect personal information from children (information that would allow someone to identify or contact the child), must comply with the Children's Online Privacy Protection Act (COPPA). For more information, see http://www.ftc.gov/ogc/coppa1.htm.

Personal information is individually identifiable information about a child that is collected online, such as full name, home address, email address, telephone number or any other information that would allow someone to identify or contact the child. The Act and Rule also cover other types of information-- for example, hobbies, interests and information collected through cookies or other types of tracking mechanisms -- when they are tied to individually identifiable information.

The primary goal of COPPA is to place parents in control over what information is collected from their children online. Only answer these questions if the site is targeted for children under 13 years old AND collects personal information.

a. Has the Web site operator posted their privacy policy on the site?

❑ Yes ❑ No ❑ Can't Tell ❑ Not Applicable

b. Does the site require parents' permission before collecting personal information from children younger than 13?

❑ Yes ❑ No ❑ Can't Tell ❑ Not Applicable

Reviewer comments:

Criterion 8: Appropriate information/resources are provided for informal education products with a formal education component.

For example, informal education products that are intended to be used in conjunction with a school visit, formal classroom instruction or formal education program include appropriate resources/support materials, e.g. pre-visit and post-visit activities; alignment to educational standards; and information for the teacher.

Rating: ❑ Outstanding ❑ Very Good ❑ Good ❑ Fair ❑ Poor ❑ Not Applicable

Reviewer comments:

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Criterion 9: Material is relevant to NASA-unique Science Mission Directorate (SMD) Content*

Rating: ❑ Outstanding ❑ Very Good ❑ Good ❑ Fair ❑ Poor

NASA SMD products/programs should be centered on and draw upon NASA's unique assets in Earth or Space Sciences: content/information (acquired through NASA science and technology programs and missions); facilities and tools (including observational datasets); or people (including NASA employees and NASA-sponsored scientists, technical and engineering experts) in at least one of the following areas:

- Astrophysics
- Earth Science,
- Heliophysics,
- Planetary Science,

Following provides an overview for each of these science areas. Do not use these examples as a checklist. Not all examples under each area are expected to be addressed by every product; it's acceptable for an education product to focus on only one of the examples given.

For more information on NASA SMD, see: http://science.nasa.gov and the 2014 NASA Science Plan, http://science.nasa.gov/media/medialibrary/2014/05/02/2014_Science_Plan-0501_tagged.pdf

** Please refer to the appropriate SMD area as identified in the product submission form. **

Astrophysics

NASA's strategic objective in astrophysics is to discover how the universe works, explore how it began and evolved, and search for life on planets around other stars.

Three broad scientific questions and goals emanate from this objective.

- How does the Universe work? Probe the origin and destiny of our universe, including the nature of black holes, dark energy, dark matter and gravity.

- How did we get here? Explore the origin and evolution of the galaxies, stars and planets that make up our universe.

- Are we alone? Discover and study planets around other stars, and explore whether they could harbor life.

Earth Science

NASA's strategic objective in Earth science is to advance knowledge of Earth as a system to meet the challenges of environmental change, and to improve life on our planet.

NASA's Earth science program seeks to answer the following questions:

- How is the global Earth system changing?
- What causes these changes in the Earth system?
- How will Earth's systems change in the future?
- How can Earth system science provide societal benefits?

These science questions translate into seven overarching science goals:

- Advance the understanding of changes in the Earth's radiation balance, air quality, and the ozone layer that result from changes in atmospheric composition (Atmospheric Composition)
- Improve the capability to predict weather and extreme weather events (Weather)
- Detect and predict changes in Earth's ecological and chemical cycles, including land cover, biodiversity, and the global carbon cycle (Carbon Cycle and Ecosystems)
- Enable better assessment and management of water quality and quantity to accurately predict how the global water cycle evolves in response to climate change (Water and Energy Cycle)
- Improve the ability to predict climate changes by better understanding the roles and interactions of the ocean, atmosphere, land and ice in the climate system (Climate Variability and Change)
- Characterize the dynamics of Earth's surface and interior, improving the capability to assess and respond to natural hazards and extreme events (Earth Surface and Interior)
- Further the use of Earth System science research to inform decisions and provide benefits to society

Planetary Science

NASA's strategic objective in planetary science is to ascertain the content, origin, and evolution of the solar system and the potential for life elsewhere.

We seek to answer fundamental questions:

- How did our solar system form and evolve?
- Is there life beyond Earth?
- What are the hazards to life on Earth?

These important questions have been translated into the following science goals:

- Explore and observe the objects in the solar system to understand how they formed and evolve.

- Advance the understanding of how the chemical and physical processes in our solar system operate, interact and evolve.
- Explore and find locations where life could have existed or could exist today.
- Improve our understanding of the origin and evolution of life on Earth to guide our search for life elsewhere.

- Identify and characterize objects in the solar system that pose threats to Earth, or offer resources for human exploration.

The Planetary Science Division includes programs with three major classes of mission destinations:

Inner solar system – Earth's Moon, Mars and its satellites, Venus, and Mercury

Outer solar system – Jupiter and its rings and moons, especially Europa; Saturn and its rings and moons, especially Titan and Enceladus; Uranus and its moons; Neptune and its moon Triton; the dwarf planet Pluto and its small moons; and other Kuiper Belt Objects

Small bodies in the solar system, Comets, asteroids, and the dwarf planet
Ceres in the asteroid belt

Heliophysics

NASA's strategic objective in heliophysics is to understand the Sun and its interactions with Earth and the solar system, including space weather.

The domain of heliophysics ranges from the interior of the Sun, to the upper atmosphere and near-space environment of Earth (above 50 kilometers), and outward to a region far beyond Pluto where the Sun's influence wanes against the forces of interstellar space. Earth and the other planets of our solar system reside in this vast extended atmosphere of the Sun, called the heliosphere, which is made of electrified and magnetized matter entwined with penetrating radiation and energetic particles.

To increase our understanding of the heliopshere, NASA seeks to answer fundamental questions about this system's behavior:

- What causes the Sun to vary?
- How do geospace, planetary space environments, and the heliosphere respond?
- What are the impacts to humanity?

To answer these questions, NASA's Heliophysics Division is implementing a program to achieve three overarching science goals:

- Explore the physical processes in the space environment from the Sun to the Earth and throughout the solar system
- Advance our understanding of the connections that link the Sun, the Earth, planetary space environments, and the outer reaches of our solar system
- Develop the knowledge and capability to detect and predict extreme conditions in space to protect life and society and to safeguard human and robotic explorers beyond Earth.

<u>Reviewer comments:</u>

Criterion 10: Risk(s) from the proposed materials/equipment/protocol etc., and risk mitigation procedures identified.

Rating: ❑ Outstanding ❑ Very Good ❑ Good ❑ Fair ❑ Poor

When considering the adequacy of safety risk identification, communication and mitigation, the reviewer should consider whether the current educational product:

1. Confirms that this science educational product was reviewed to assure conformance with standards of applicable subject matter scientific excellence, integrity and objectivity, but that no review was done with respect to Consumer Product Safety Commission (CPSC) rules and regulations or any other safety science related law, rules or regulations;

2. Conforms with the guidance set forth in the National Science Teachers Association (NSTA) Policy Position on Safety and School Science Instruction;

3. Identifies the professional practice standard for science teachers set forth in document entitled "NTSA – Duty or Standard of Care", by the NTSA Safety Advisory Board, April 2014, and any updates thereto;

4. Ensures that the protocol clearly notes that human subject testing criteria must be considered and comply with applicable law? This applies if student or other human derived data are an integral part of the activity (humans test subjects, tasting something or other responses evaluated).

5. Makes it clear that ultimately it is the responsibility of the science teachers and school administrators to use appropriate legal standards and better professional practices under duty of care to make the science laboratory safer.

6. Makes clear that it is the SCHOOL, SCHOOL SYSTEMS, LOCAL, STATE OR FEDERAL LAWS, REGULATIONS, CODES AND PROFESSIONAL STANDARDS that set the safety criteria and standards that apply to the science educational product design and use; and encourage the teacher to check with their local authorities to get approval for use of such science educational products in their classroom.

7. Makes clear that the science educational product is provided as-is without warranty with respect the safety rules, regulations and laws.

{Specific areas of specific safety related review might include, but are not limited to: (*Do not use these suggestions as a checklist.*)}

- Is the activity appropriate for the specified ages/grade levels? Can the relevant safety risk be communicated and managed with the target age group such that any mitigation steps can be enforced and not easily bypassed. If not, what ages/grade levels would be appropriate for this science education product?

- What, if any, safety equipment is identified (safety goggles, gloves, adequate ventilation, earplugs, dust masks, footwear, helmets, etc.)? If properly used would the safety equipment reduce risk of injury or other damage and will the target age group likely be able to successfully use such safety equipment properly with the student to teacher ratio common to the target age group?

- Are there any attire limitations included in the instructions, for example if loose clothing could

be a hazard or closed shoes are required. If so, are instructions clear that students whose attire does not conform to the safety criteria must be excluded from participation in the science education activity?

- If observing the daytime sky is involved, is instruction to never look directly at the sun included? If observing Sun-related events are involved, are safe solar viewing apparatus provided along with training and instruction in their proper use?

- When foods are used (consumed or not), have appropriate steps been taken to address and mitigate risks for those with food allergies, and from contamination of food, intentionally or unintentionally? Is the need for hand washing and container sterilization and other relevant food safety criteria made clear?

- Is instruction provided regarding injury mitigation when running or other exercise, etc. is involved in the lesson?

Reviewer comments:

Criterion 11: Other reviewer comments

Provide comments on any perceived good or bad qualities that were not measured by any of the previous criteria.

Reviewer comments:

Earth & Space Science Informal Education Review Summary

Criteria	Rating					
1. Appropriate/Complete/ Effective Information	❑ Outstanding	❑ Very Good	❑ Good	❑ Fair	❑ Poor	
2. Production/Design Quality is high	❑ Outstanding	❑ Very Good	❑ Good	❑ Fair	❑ Poor	
3. Effectively integrate learning technologies	❑ Outstanding	❑ Very Good	❑ Good	❑ Fair	❑ Poor	❑ N/A
4. Content is accurate	❑ Outstanding	❑ Very Good	❑ Good	❑ Fair	❑ Poor	
5. Good references for further investigation	❑ Outstanding	❑ Very Good	❑ Good	❑ Fair	❑ Poor	
6.Ease of Use/Free from Technical Difficulties	❑ Outstanding	❑ Very Good	❑ Good	❑ Fair	❑ Poor	❑ N/A
7. Conformance with COPPA						
Posted Privacy?	❑ Yes	❑ No	❑ Can't Tell		❑ N/A	
Parent's Permission?	❑ Yes	❑ No	❑ Can't Tell		❑ N/A	

8. Appropriate support provided for products with formal education component	❑ Outstanding	❑ Very Good	❑ Good	❑ Fair	❑ Poor	❑ N/A
9. Relevance to SMD content	❑ Outstanding	❑ Very Good	❑ Good	❑ Fair	❑ Poor	
10. Safe use of materials	❑ Outstanding	❑ Very Good	❑ Good	❑ Fair	❑ Poor	❑ N/A
Overall Assessment	❑ Outstanding	❑ Very Good	❑ Good	❑ Fair	❑ Poor	

Summary Comments:

Recommendation

Check your recommendation(s) for this product:

- ❑ Recommended: The product is an excellent candidate for broad distribution or availability, for example, at education conferences, on a WWW site, etc.
- ❑ Recommended as is, with revisions on next printing/edition**.** Note to reviewers: the material may not be re-printed/revised, do not select this option if you believe the revisions are necessary before continued distribution/availability by NASA. (**Provide notes on recommended revisions**).
- ❑ Recommended -- Distribution through Teacher Workshops. This product is recommended for distribution through NASA teacher training sessions and workshops. Most teachers would require some introduction or training for effective use.
- ❑ Recommended -- Limited Audience. This product would be useful to limited audience, for example, very advanced users, lower/higher education level than originally identified, a limited topic area/course, a limited geographic area, etc. Provide notes below describing this audience.
- ❑ Needs Minor Revisions: The overall approach is very good, but **minor** revisions are needed before this product is distributed or recommended by NASA. "**Minor"** is not meant to indicate that the revisions aren't important to make, but that they can be easily made. The material is generally free of scientific errors/misconceptions or obvious pedagogical problems; if there are errors they can be easily corrected. These products are not required to go back through the panel review process once they have been revised.

  Examples of minor revisions include:
  - Few text edits/minor text additions (e.g., grammatical errors, misspellings, and typos)
  - Minor corrections to images or graphics
  - Minor re-organizing of the material
  - Online Products: a few broken links on a Web site (It is "Minor" due to ease of correcting.)
  - Hard Copy Products: broken WWW links in a hard copy product, which are not critical to implementation (e.g., links to further reading/information).

- ❑ Needs Medium Revisions: The overall approach is sound, but revisions are required before this product is distributed or recommended by NASA. Depending on the extent of revisions to be made, NASA education program managers may require these products to go back through the panel review process after they have been revised.

  Examples of medium revisions include:
  - Large number of text edits/additions throughout the material (e.g., grammatical mistakes, typos, misspellings)
  - Corrections to more than a few images or graphics
  - Sections that suffer from organizational or presentational difficulties
  - Numerous broken links on a Web site
  - Several broken Web links on a hard copy product, which are not critical to the implementation of the product (e.g., links to further information/research)
  - Few scientific errors/misconceptions (perhaps limited to a single section, chapter, unit or lesson)
  - Isolated sections/chapters/units/or lessons that contain obvious pedagogical problems

- ❑ Needs Major Revisions: This product has potential, but **major** revisions are required to the overall approach before it is distributed or recommended by NASA. Products that are recommended for "major revisions" are required to go back through the panel review process after they have been revised.

  Examples of major revisions include:

  - Numerous or major scientific errors/misconceptions.
  - Serious problems with the overall approach to the subject, organization, structure, or presentation that renders it ineffective or difficult to use.
  - Pedagogical approach needs significant work for the intended audience (e.g., reading level, cognitive approach, scope/sequence, etc.).
  - Broken links in a printed document, which are critical to the implementation of the product.

- ❑ Not Recommended: NASA should take this product out of circulation/not release it as a Science Mission Directorate science education product. The quality is poor, the material dated, or it is not relevant to NASA's Science Mission Directorate.

- ❑ Other (**Specify**):

NOTES:

Product Title:_____**Number:**_____

Reviewer Name:_____