NSDL Resource Quality Guidelines
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The National Science Digital Library (NSDL) has resource quality guidelines to assist in resource identification and selection, define a level of expectation/performance, and provide best practices for resource and collection development. The expectation is that NSDL resources, in keeping with their specific natures, will reflect as many as possible of the quality characteristics described below. Contributors to NSDL should consider these guidelines when initially creating resources and accessioning them into digital repositories.

1. The resource is scientifically accurate

NSDL resources should be scientifically accurate at the time of accessioning and up-to-date as of the initial accessioning date in the library (historical resources may need further identification/clarification as to their nature). Resources should meet ***as many as possible*** of the following criteria:

- review for accuracy has been made by qualified specialist(s) in the appropriate field; ideally, the qualifications of the specialists are disclosed
- the resource identifies assumptions and distinguishes between observation/fact and interpretation/hypothesis
- technical terms are defined or a glossary is provided

2. The origin of the resource is attributed

Resource attribution may be to a person or persons, to an organization, or to both. This should include:

- name of the resource creator (individual and/or sponsoring institution)
- contact information for the resource creator or maintainer at the time
- date of resource creation or most recent update

3. The resource is robust, functional and accessible

- Resources should be fully operational and should be free of conspicuous bugs, defects, and nonworking elements (e.g. links that don't work, graphics that don't display, applets that don't run) that inhibit intended use
- work on one or more versions of major web browsers, under operating systems generally used in educational settings
- be accessible by individuals with disabilities, where possible
- allow printing of text and graphic elements

4. The resource has complete documentation

Resources should be as fully documented as possible for their intended audience needs, in terms of references, educational information, licensing and reusability rights, technical requirements, and included data and models, as described below.

4.1 Reference documentation

- reference lists or bibliographies are present
- links to related web sites are provided

4.2 Educational documentation

- alignment with educational standards (state and national)
- indication of the appropriate age or educational level
- prerequisite skills and understandings
- learning objectives
- commonly observed mistakes or misconceptions
- notes on instructional strategies
- a list of required materials
- safety precautions
- an estimate of time required

4.3 Rights and use documentation

- ownership and licensing for use and creating derivative works, such as Creative Commons, GPL, or some other copyright and use statement

4.4 Technical documentation

- specification of hardware required to use the material
- specification of and links to necessary software
- disclosure of any known hardware or software incompatibilities
- access to appropriate user's guide
- indication of file sizes of downloadable materials or large viewable files

4.5 Data documentation[1]

- access to information about the instrument that collected the data
- information about when, where and how the data (observed, remotely sense or derived) was collected
- links to sources of original data and tools to access the data

4.6 Model and simulation documentation

- name of the model
- description or references to assumptions underlying the model and how the model works

5. The resource is pedagogically effective

Effective resources that incorporate pedagogies tend to have the following characteristics:

- ability to engage learners
- ability to create curiosity about a topic or the material
- provides a vehicle for asking questions or seeking further information
- the instructional strategies build mastery of learning objectives
- scaffolding for a high-level of performance
- the level of difficulty is appropriate for the stated target audience
- assessment options with or within the resource and guidance for teachers, such as an answer key or scoring rubric
- feedback has been gathered from and is available to educators and learners who have used the material
- instructional time is commensurate with the importance and magnitude of the learning achieved

6. The resource is easy to use for educators and learners

Easy-to-use resources tend to include the following characteristics:

- navigation pathways and usability are self-evident and intuitive
- preparation time and effort is not excessive relative to the educational potential of the material
- usability by the intended audience is appropriate
- adaptability for educators' and learners' interests, abilities, and needs like:

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[1] Note: Additional review criteria for data sites can be found in:
Ledley, T. S., Prakash, A., Manduca, C., & Fox, S. (2008). Recommendations for making geoscience data accessible and usable in education. *Eos, 89*(32). Available from:
http://www.agu.org/journals/eo/eo0832/2008EO320003.pdf - anchor (AGU members) or
http://serc.carleton.edu/files/usingdata/dawg/recommendations_making_geoscie.v2.pdf.

- teacher-editable versions of student handouts
- several levels of difficulty or complexity in student activities
- links to maps or local datasets for use in different locations

7. The resource is free of distracting or off-topic advertising

Resources should be as free of distracting advertising as possible, especially advertising that is irrelevant or that interrupts or interferes with the use of the material or may be inappropriate for the intended user group.

