# Judging the Quality of K-12 NSDL resources: Beyond Content Alignment (NSF DUE-0226354)

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## Purpose

AAAS Project 2061 is collaborating with the Harvard-Smithsonian Center for Astrophysics to establish a digital video library (DVL) that supports STEM education by linking DV resources to national content standards, specifically those found in *Benchmarks for Science Literacy*. The resources include footage demonstrating children's thinking, interviews with experts in science and science education, and demonstrations of natural phenomena.

## Project Approach

**Content Alignment.** A video review tool, with provisions for indicating start and end times of relevant video segments and recording reviewers' comments, was developed to identify sections of video footage that can be linked to national content standards (Figure 1). These sections will be used to build a Digital Video Library using PhP and MySQL as the development tools. Coding to a benchmark is done if the video contains information that is aligned with the specific ideas in the benchmark. Figure 2 shows a still from a video material that addresses one of the key ideas on a strand map. A strand map depicts how students might grow in their understanding and skills toward particular science literacy goals.

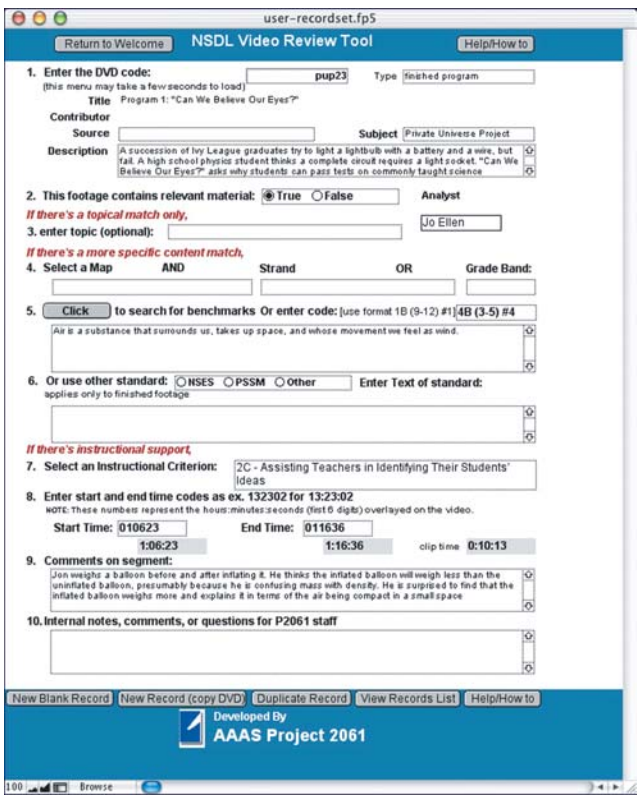



**Fig. 1.** The video review tool for the Harvard-Smithsonian DVL project allows analysts to "mark" and assign video segments to benchmarks and instructional criteria.

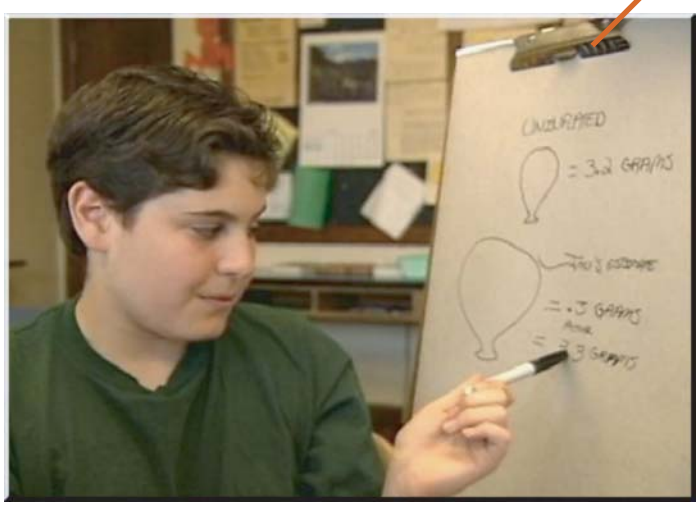
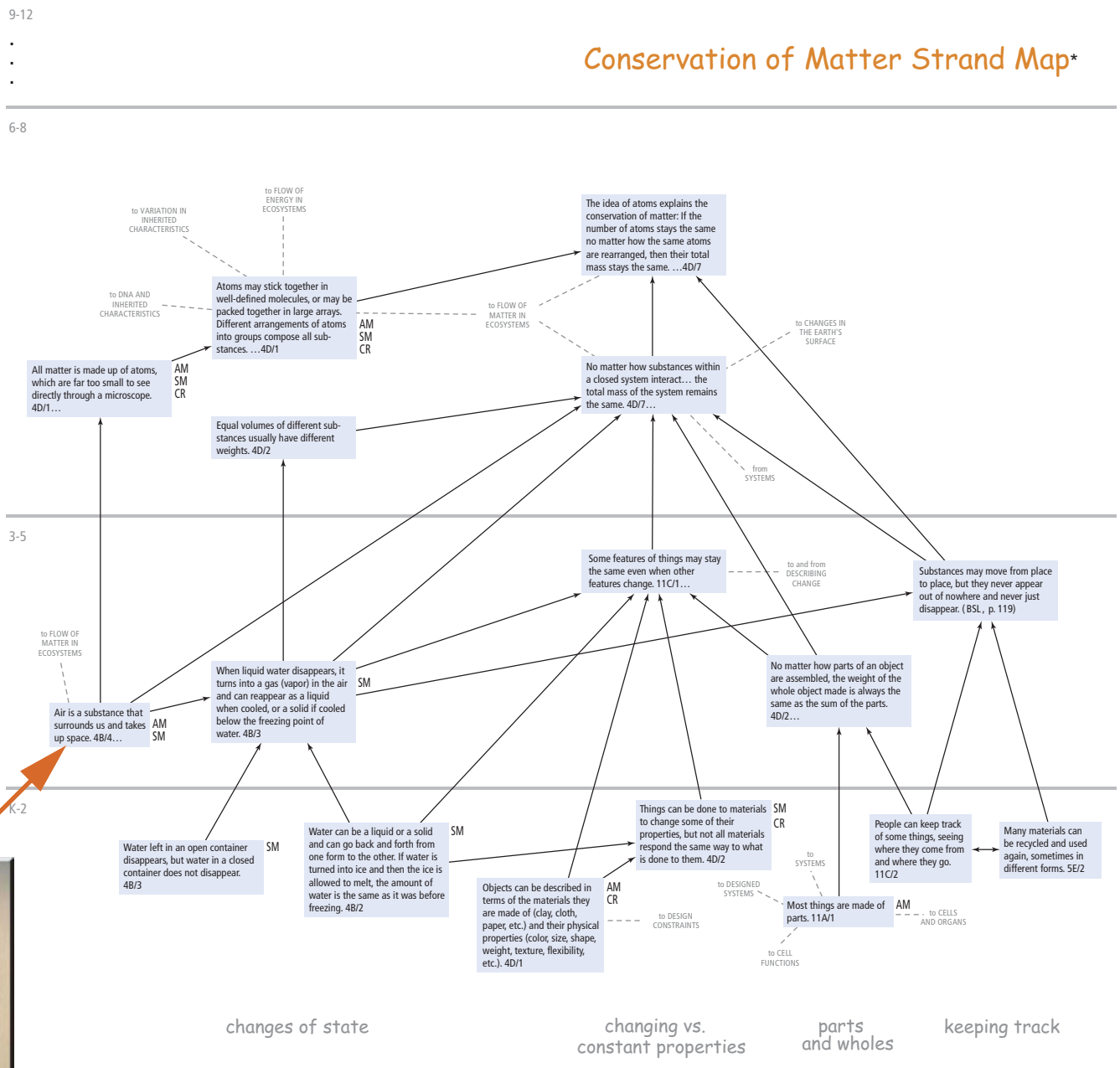


**Fig. 2.** Still from a video segment that aligns to the key idea "Air is a substance..." in the Conservation of Matter Map. The student thinks the inflated balloon will weigh less than the uninflated one, presumably because he is confusing mass with density. He is surprised to find that the inflated balloon weighs more and explains it in terms of the air being compact in a small space.




*From *Atlas of Science Literacy* (AAAS, 2001).

## Value Added: Going Beyond Content Alignment

**Instructional Support.** In the process of reviewing video materials for their relationship to content standards, we realized that the value of the DVL could be further enhanced by analyzing and reporting on the level of instructional support that the materials provide. Therefore, in addition to alignment with content standards, we have begun matching video segments to criteria that we have traditionally used for analyzing how textbooks support learning and effective teaching (Kesidou and Roseman, 2002)**. The purpose is to make explicit the kind of instructional support that the material provides. Examples of these criteria are given in Table 1. Besides alignment to a benchmark, the video from which the still in Figure 2 was taken also illustrates the criterion, "Assisting teachers in identifying their students' ideas."

**Table 1**
Some of the Criteria Used for Judging the Quality of a Given Resource's Instructional Support

**I. Providing a Sense of Purpose**

**II. Taking Account of Student Ideas**

**B. Alerting Teachers to Commonly Held Student Ideas.** Does the material alert teachers to commonly held student ideas (both troublesome and helpful) that are relevant to the learning goals and described in the learning research literature?

**C. Assisting Teachers in Identifying Their Students' Ideas.** Does the material include questions and/or tasks to help teachers identify what their students think about familiar situations and/or phenomena related to the learning goals before these goals are introduced?

**D. Addressing Students' Ideas.** Does the material assist teachers in explicitly addressing students' ideas relevant to the learning goals?

**III. Engaging Students with Relevant Phenomena**

**A. Providing a Variety of Relevant Real World Examples/Phenomena.** Does the material provide multiple and varied real world examples/phenomena to support the learning goals?

**IV. Developing and Using Scientific Ideas**

**C. Representing Ideas Effectively.** Does the material include accurate and comprehensible representations of the learning goals?

**V. Promoting Student Thinking about Phenomena, Experiences, and Knowledge**

**VI. Assessing Progress**

**VII. Enhancing the Science Learning Environment**

## Need for a Digital Library of Instructional Resources

We are seeking collaborators to establish a digital library of instructional resources that are not only aligned to content standards but also meet criteria for learning and effective teaching. In addition to digital video, these resources might include: 1) summaries of research on students' understanding of key science ideas, 2) questions and tasks that can help assess students' understanding, and 3) phenomena and representations that can make the key ideas plausible and intelligible to students. We will leverage technologies arising from our other NSDL collaboration, "Strand Maps as an Interactive Interface to NSDL Resources" (DUE-0226286) to provide a graphical interface that will unify and access these components.

While identifying alignment to content standards is a step in the right direction for digital libraries, we believe that evaluating the quality of K-12 NSDL resources should be taken a step further to include a determination of the type of instructional support that they provide so that these DL resources can be a part of an effective teaching strategy.

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**Kesidou, S., & Roseman, J.E. (2002). How Well Do Middle School Science Programs Measure Up? Findings from Project 2061's Curriculum Review. Journal of Research in Science Teaching, 39, Issue 6, 522-549.