# "Spacecraft Reveals Recent Geological Activity on the Moon"

## EXPLORING THE FEATURES OF NASA TWITTER POSTS AND THEIR POTENTIAL TO ENGAGE ADOLESCENTS

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Incorporating NASA's Twitter site into classroom instruction provides adolescents with an opportunity to learn about disciplinary literacies in the field of science as well as expectations for reading and composing in social media sites.

On its Twitter site, the National Aeronautical and Space Administration (NASA) recently tweeted "I Am A Nobel Laureate, Ask Me Anything." The tweet linked to an article announcing when NASA's nobel laureate, John Mathers, would be answering questions on the Reddit website. Through this eight-word post, followers were invited to interact with a leading scientific expert, examine current scientific knowledge, and explore scientific literacies in a coconstructed online community created by social media. Twitter is a social media website where registered users can post brief messages of up to 140 characters called tweets; longer multimodal texts are typically linked to the original post. NASA is a federal agency in the United States that promotes aeronautics and aerospace research. Reddit is a social news and entertainment website that allows registered users to post texts and links; other registered users then vote on the post and determine its placement on the website. That anyone who logged on to Reddit at the specified time could ask questions of a high-status astrophysicist is indicative of the participatory phenomenon of social media.

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The term *social media* refers to Internet websites that provide a forum for creating and exchanging information with a large number of people. A key feature of social media is that everyone who has access to the Internet can participate in the production and dissemination of information. Another feature is that participants feel connected to the individuals they engage with and believe their posts contribute to the followers' lives (Jenkins, 2006). Social media (e.g.,



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Facebook, Pinterest, Twitter) are growing rapidly around the world. What was once critiqued as a haphazard distraction to academic learning has evolved into political activism and information sharing that is an intentional, immediate, and democratic form of communication (Hobbs, 2010). Although a growing body of research explores the potential for integration of information and communication technologies (ICTs) in K–12 curricula (e.g., Lewis & Fabos, 2005; Schillinger, 2011), many of the texts produced by social media remain beyond the realm of classrooms, largely relegated to the role of "alternative" texts and rarely, if ever, utilized as a core text.

One of the reasons social media texts have remained on the periphery of schooling is that the skills required to read and compose such texts are not tested on district- and state-mandated reading or technology assessments (Coiro, 2011a; Leu, O'Byrne, Zawilinski, McVerry, & Everett-Cacopardo, 2009; Mokhtari, Kymes, & Edwards, 2008). Further, reading and composing Web-based texts require a particular set of skills, and much of the field's understanding about such processes is evolving along with the kinds of texts being generated by ICTs (Coiro, 2005; Coiro, 2011a, 2011b; Guzzetti, Elliott, & Welsch, 2010).

Literacy researchers have also questioned the extent to which individuals participate in Internet venues equally and with the same degree of efficacy (e.g., Hobbs, 2010). This is especially an issue for adolescents who have access to the Internet but little guidance in critically analyzing texts they encounter on the Web (Burnett & Merchant, 2011; Coiro, 2011b). In fact, research into the ways adolescents participate in New Literacies has raised questions about the amount and type of guidance adolescents need in their interactions with Internet texts. Some of this research has focused on ways teachers should create pedagogical bridges between adolescents' in-school and out-of-school literacy practices (Alvermann, 2002; Lewis & Fabos, 2005). Other studies have reached the conclusion that without instruction in adopting a critical lens with texts encountered on the Internet, adolescents are prone to replicate oppressive social views and practices (Lesley, 2012).

*Reading and composing Web-based texts require a particular set of skills.*

With respect to NASA's Twitter site, research concerned with adolescents' online reading practices raises questions about how much guidance a student needs in order to learn the particular linguistic structures that are characteristic of scientific literacy and digital genres of text. Similarly, such research raises questions about the extent to which adolescents learn to participate in science activities by following social media and invites questions of what teachers need to know about the discursive structure of social media to help adolescents learn through and contribute to these media and intellectual community.

In this article, I present an analysis of texts posted to NASA's Twitter site and argue that, because of its focus on a novice audience and inclusion of a variety of text structures, it can serve as a scaffold for developing reading comprehension and writing skills required for reading and composing various genres of scientific text. Because Twitter includes participatory, multimodal text that is constantly updated, I also argue that Twitter can serve as more engaging text for adolescents than traditional science textbooks.

## Scientific Literacies

Definitions of *science literacy* have been driven by the following: (a) text structure (e.g., refutational text, primary literature text, popular text), (b) audience, (c) sociocultural phenomena (d) knowledge base about science, (e) language, (f) Discourse communities, and (g) the content area literacy turn (i.e., using literacy practices to enhance scientific learning). The quest for a definition over the past two decades has led to a rich interdisciplinary examination of scientific processes (e.g., Hand et al., 2003). Extending back to the 1950s, the prevailing definition of *scientific literacy* was fundamentally viewed as the general public's familiarity with scientific concepts (DeBoer, 2000). In tandem with science education reforms fueled by the standards movement, in the 1990s science literacy became largely intertwined with a pedagogy of inquiry (DeBoer, 2000). Since that time, scientific text structure and Discourse have come into sharper focus as key ingredients to scientific literacy.

Virtually all contemporary definitions of *scientific literacy* have continued to include the 1950s Sputnik-driven emphasis on a strong science knowledge base and ability to reason. For instance, building on Shamos's (1995) dichotomy of scientific literacy as either "functional" or "true," Baram-Tsabari and Yarden (2004) defined *functional scientific literacy* as "the ability to converse, read, and write coherently in a nontechnical but meaningful context" (p. 403). They defined true scientific literacy as "'scientific habits of mind' such as logical reasoning, the role of experiments, reliance on evidence, the ability to think critically and other elements of scientific investigation" (p. 403).

Hand et al. (2003) argued that scientific literacy was grounded in language and presented a dualistic view of scientific literacy wherein science literacy involved not only "being fluent in the language, discourse patterns, and communication systems of science" but also "being knowledgeable, learned and educated in science" (p. 608). In this dualistic definition, linguistic practices were bounded by particular Discourse communities (Gee, 2005).

As part of defining what scientific literacy is, several studies have examined factors that affect student comprehension of scientific text, such as reader characteristics (e.g., working memory, engagement), text properties, and instruction (e.g., Kendeou and Van Den Broek, 2007). Much emphasis has been placed on students' inaccurate prior knowledge or misconceptions and how these affect their ability to comprehend scientific texts. Given this phenomenon, some studies have focused on the text structure of "refutation texts" and their potential to repair students' scientific misconceptions (Guzzetti, 2000; Kendeou and Van Den Broek, 2007).

Another compelling area of research involving reading comprehension has examined primary scientific literature. Primary scientific literature consists of research reports composed by the scientist who conducted the research. This type of literature tends to contain passive-voice sentence constructions, abstract nouns in place of verbs, verbs of abstract relation in place of verbs of material action, a dearth of reader-friendly figurative language, and few if any everyday analogies or examples (Barum-Tsabari & Yarden, 2004; Lemke, 1990). In a study with high school students of differing degrees of prior knowledge about biology, Barum-Tsabari and Yarden (2004) found that primary literature led to an increased understanding of the scientific process of inquiry. They noted that primary literature has a "unique potential…to instruct students on the nature of scientific reasoning and communication" (p. 418). However, they also found that popular literature led to greater understanding of scientific concepts.

## Microblogging

Microblogging is an increasingly popular form of social media. It consists of brief, often frequently posted texts that communicate information to an audience via social networking sites on the Internet (e.g., Instagram, Tumblr). As the growing number of such sites attests, microblogging is on the rise among teens (Lenhart, Purcell, Smith, & Zuckuhr, 2010).

Twitter is a microblogging tool wherein participants post print text tweets of up to 140 characters. Longer texts presented through a variety of modalities and structures (e.g., photographs, articles, videos) are typically linked to the original tweet. Each tweet has a hashtag, a word or phrase preceded by a pound (#) symbol that followers can use to search all posts on the same topic. Posts organized by a hashtag give followers an opportunity to view an ongoing conversation on a particular topic with multiple participants and to join the discussion.

Although Twitter was recently cited as the second most popular social media site for teens in the United States (Fox, 2013), microblogging on Twitter is not used solely for social networking. Increasingly, Twitter is used to foster academic processes of sharing information, requesting assistance/information, and forming digital identities (Gillen & Merchant, 2013; Veletsianos, 2012). Gao, Luo, and Zhang (2012) found that microblogging promotes participation, engagement, reflection, and collaboration in a variety of educational settings. In the sciences, Twitter has been touted as an effective means of reaching a public audience on topics such as conservation (Gittner, 2011; Shiffman, 2012; Yardis & Boyd, 2010). Educators, similarly, have argued in favor of incorporating Twitter into higher education and K–12 curricula (Edmondson, 2012; Kasseus-Noor, 2012; Kist, 2013; Wotzko, 2012). Although research involving the integration of Twitter into a variety of professional and educational settings is largely nascent, it is clear from existing studies that the site's popularity makes it an intriguing tool to consider for classroom integration.

## Methods

### Analyzing Twitter

To understand the scope of reading tasks required for comprehension of social media texts and to better understand the potential this forum can provide for classroom instruction, I set out to examine the distinct features of texts posted by the NASA organization to the social media site Twitter. The following research question guided my inquiry: What does content analysis of NASA Twitter posts reveal about their discursive features? To gain an understanding of the potential for social media to serve as texts that foster scientific literacy, I engaged in a qualitative content analysis of tweets posted over five months by NASA on Twitter.

Content analysis is a method of analyzing a corpus of text by tallying trends in concept and structure (Bernarad, 2000). Such an analysis involves identifying a sample, creating a template of codes, and applying the codes to a set of texts. In a qualitative content analysis, both frequency and interpretation of the codes are used to analyze the text.

The primary data sources for this study consisted of a sample of 200 tweets posted to Twitter by NASA. I also examined any text that was linked to the 200 tweets for genre, structure, and modality. I did not use criteria per se to select the tweets. Rather, I read and incrementally analyzed tweets posted in segments of time spread over five months. I did not use any particular criteria to select the tweets because I wanted to understand the trends in types of tweets posted as they occurred spontaneously.

To conduct the content analysis, I first analyzed each tweet posted by NASA as the primary unit of analysis. I then analyzed the modalities of the text linked to the tweet as the secondary unit of analysis. To focus my inquiry, I developed a template of codes based on theories of scientific literacies. (See Figures 1 and 2 for a list of the codes used in the primary and secondary unit of analyses.) For the primary unit of analysis, I looked at sentence structure (i.e., simple, compound, complex, fragment), sentence purpose (i.e., declarative, interrogative, imperative, exclamatory), intended audience (i.e., expert, novice), assumed scientific prior knowledge (i.e., vocabulary, concept, history), and author intention (i.e., inform, refute, evaluate, and entertain). For the secondary unit of analysis (i.e., text linked to the tweet), I looked at text genre (e.g., article, blog entry, transcript, photograph), text structure, and modality. In

FIGURE 1 Codes Used for the Primary Unit of Analysis

| | | | |
|---|---|---|---|
| **Sentence Structure:** | | | |
| Simple | Compound | Complex | Fragment |
| **Sentence Purpose:** | | | |
| Declarative | Interrogative | Imperative | Exclamatory |
| **Intended Audience:** | | | |
| Scientific Novice | Scientific Expert | NASA Affiliated | Non-NASA Affiliated |
| **Assumed Scientific Prior Knowledge:** | | | |
| Vocabulary | Concept | History | |
| **Author Intention:** | | | |
| Inform | Refute | Evaluate | Entertain |

FIGURE 2 Codes Used for the Secondary Unit of Analysis

| | | | |
|---|---|---|---|
| **Text Genre:** | | | |
| Article | Blog Entry | Transcript | Photograph |
| **Text Structure:** | | | |
| Narrative | Expository | Refutational Text | Primary Literature |
| **Text Modality:** | | | |
| Print Text | Photograph | Live Image/Video Streaming | Video |

terms of text structure, I looked at the following categories: narrative, expository, refutational text, and primary literature. (See Figure 3 for an example of an analyzed tweet.)When I had analyzed 200 tweets, I tallied the results to get a sense of the trends in the posts and continued to monitor tweets to look for discrepant examples that contradicted my findings to ensure saturation of the data (Erickson, 1986).

## Theoretical Perspectives

I grounded this study in three theoretical perspectives that lend themselves to literacy applications in science classroom contexts: (1) New Literacies studies, (2) disciplinary-focused theories of content area literacy, and (3) science education as sociocultural practice. I turned to New Literacies theories in framing this study because this body of research has focused on the evolving and transformative nature of ICTs and the implications for literacy instruction (Coiro, Knobel, Lankshear, & Leu, 2008). In particular, New Literacies studies have noted adolescents' engagement with using participatory media (Davis, 2004; Schillinger, 2011; Thomas, 2004).

Given the content of the NASA tweets, a second perspective that informed my approach was research from the field of content area literacy that is concerned with disciplinary literacies. This domain of inquiry is built on the notion that each discipline has specific and particular expectations for the ways literacy is practiced and, further, that these expectations need to be explicitly taught in order for students to fully acquire content area knowledge as well as discipline-specific literacy skills (Draper, 2008; National Council of Teachers of English [NCTE], 2011; Shanahan & Shanahan, 2008; Shanahan, Shanahan, & Misischia, 2011).

The third perspective that informed this study was that of viewing science education as sociocultural practice. Lemke (2001) argued that science education should be viewed through the lens of a

FIGURE 3 Sample Analysis of one Tweet Posted November 27, 2012

**Primary Analysis of the Tweet:**

"What have we learned from #IceBridge's Antarctic 2012 campaign?"

| Sentence Structure | Sentence Purpose | Intended Audience | Assumed Scientific Prior Knowledge | Author Intention |
|---|---|---|---|---|
| Simple sentence structure | Interrogative purpose | Question phrased for a general audience | Inclusion of the name of the research project, "IceBridge" assumes familiarity with this kind of labeling but not necessarily content knowledge about the purpose of the project | Intention of the tweet is to lead the audience to the linked text that will answer the question and provide summative information about the IceBridge project |

**Secondary Analysis of the Linked Text**

| Text Genre | Text Structure | Text Modality | Additional Notes |
|---|---|---|---|
| Article | Expository | Multimodal (print text with embedded videos and photos) | Text is geared toward an inclusive audience where there is assumed prior knowledge about scientific terminology but not assumed prior knowledge about the purpose and design of the project |

social–cultural perspective. He noted that scientific study was "inseparable from the social organization of scientists' activities" (p. 296). Lemke also posited that "science had to be understood as a very human activity whose focus of interest and theoretical dispositions in any historical period were, and are, very much a part of and not a part from the dominant cultural and political issues of the day" (p. 298). Thus, Lemke viewed science literacy as a fundamentally social practice.

## Findings

### Audience and Authorship

NASA's profile summary on Twitter states: "Explore the universe and discover our home planet with @ NASA. We usually post in Eastern time." In this introduction, NASA invites a highly public audience to explore Earth together with its organization. This invitation to explore a shared planet also promotes a sense of affinity with NASA through the use of the word *home*. Similarly, the pronoun *we*"sets the tone for the site as being formed and operated by a community. Through these two introductory sentences, Twitter followers are encouraged to join this organization and interact with its scientists.

Beyond the profile summary, through my analysis of NASA tweets, I discovered the following trends, which offer clues to the intended audience and underlying purpose of the posts. Findings from the content analysis indicated that the majority of tweets posted in this participatory social media context were written by scientists to an audience of novices, although there was some variation in what constituted a novice.

All the tweets I analyzed were authored by an anonymous NASA representative. Conversely, 90% of the linked texts were written by a specific author. Every tweet I analyzed contained linked text. I determined the intended audience for the tweets by analyzing whether an audience was explicitly addressed, the types of questions asked, and instances of refutational text. For example, one tweet read, "NASA ranked #1 in job satisfaction in the 2012 Fed. Employee Viewpoint Survey. Want to join us?" The link for this tweet directed to a webpage that specifically addressed high school students in one section and college students in another and advised them how to obtain the necessary educational goals (e.g., what classes to take) to qualify them for work as NASA scientists. Also, in all the tweets I analyzed, the questions never consisted of a scientific hypothesis or overt research question. Rather, they were "why," "how to," or "what" questions that led to linked text that then answered the questions. For example, one tweet asked "Why is NASA conducting plant research aboard the International Space Station?" The linked text led to an article about the role plants can play in providing oxygen to astronauts.

Similarly, I found tweets that were linked to refutational texts (Guzzetti, 2000) to be indicative of addressing a novice audience. Guzzetti (2000) defines *refutational text* as "a text structure that states a common misconception and directly refutes it while providing a scientifically acceptable idea" (p. 90). Some examples of refutational texts consisted of data and interviews with scientists that proved the phenomenon of global warming or texts that disproved common faulty theories about why the world would end in December 2012.

### Text Features

Other features of the content analysis I engaged in revealed that most tweets consisted of accessible sentence structures. Of the tweets, 64% of the structures were simple sentences, with 36% either declarative or imperative. Interrogative sentences were posted 32% of the time. Exclamatory sentences were listed only 8% of the time. The linked text tended to be more sophisticated in terms of expectations about scientific prior knowledge and rhetorical stance. Even so, 36% of the linked text consisted of photos. It should be noted, NASA posts an "image of the day," which contributed to the number of photos. Links to articles and websites were the next most frequent categories for linked text posted 16% of the time in the tweets I analyzed. Blogs and videos created by NASA employees (e.g., astronauts, astrophysicists) were posted 8% of the time. One chart was posted in the tweets I analyzed. Raw data consisted of photos generated by a satellite or gathered as part of space exploration through the Hubble telescope or Mars Rover. Also shared were interviews with scientists. As for the sentence structure, raw data linked to the tweets consisted of more accessible text.

### Scientific Prior Knowledge

In terms of assumed scientific prior knowledge, I looked at the frequency of references to specific scientific vocabulary (e.g., Expedition 33, deorbit burn), more general scientific concepts (e.g., global sea level), and knowledge about the history of the field of science (e.g., the first moon landing). Within these categories I found specific scientific vocabulary cited 32% of the time, more general scientific concepts 20% of the time, and historical scientific references 4% of the time. With respect to the purpose of the tweets, 28% were positioned to inform, 20% to refute faulty scientific conceptions, 16% to entertain (e.g., what nonessential items astronauts pack to go to the space station; what astronauts eat for Thanksgiving dinner), and 16% to celebrate NASA accomplishments (e.g., space shuttle landing). This analysis points to a kind of scaffolded reading experience wherein technical terminology is used with accessible text structures.

Overall, the NASA tweets I examined were written from a largely behind-the-scenes view of the organization. No matter what level of assumed scientific background knowledge was present in the tweets, a common theme was what it is like to be a scientific "insider." For instance, NASA posted several tweets about pictures taken at NASA events, such as "Check out photos from today's event renaming RBSP mission probes to Van Allen Probes. Enjoy." Tweets often contained references to divulging information about the process of obtaining scientific data, such as "Operation #IceBridge flight this month to look beneath an Antarctic ice shelf: how did we do it." Also, on numerous occasions, NASA tweeted about human-interest aspects of life aboard a space shuttle, flying in a plane over Antarctica, or living on the international space station. For example, the following tweet focused on what scientists involved in the IceBridge project had for lunch: "Lunch time on the DC-8 over Antarctica: today's menu is salmon with brussel sprouts, avocado, mashed potatoes. Can't complain!" This trend of highlighting human-interest stories was pervasive on the site.

Although questions were often asked in the tweets, they rarely consisted of research questions or hypotheses. Rather, they were meant to pique interest in the behind-the-scenes workings of NASA scientists: "How do you protect spacewalking astronauts? Learn more about spacesuits and their history." The prevalent behind-the-scenes viewpoint and human-interest tweets helped make science appear less intellectually austere and pristine. Although such a stance could be critiqued as being a public relations maneuver, these kinds of questions and details also served to demystify science and thus make it more accessible to a novice audience.

Given that the NASA texts were shared in a highly public forum fostered what Yarden (2009) referred to as "adapted primary literature," because the tweets contained data and operational narratives normally communicated among scientists but now shared in a popularized social networking forum (p. 307). Adapted primary literature bridges science texts created for scientists with those created for the general public. Thus, adapted primary literature can "represent 'real science' in schools and promote important aspects of high-school students' scientific literacy that are harder to achieve using textbooks" (p. 309). The tweets posted by NASA also encouraged a Discourse community (Gee, 2005) between experts and novices that, despite consisting of a fair amount of prior knowledge about scientific topics (e.g., meteor shower), was also participatory, which made the texts more accessible and much more personable. Although the tweets consisted of print text, the links were highly multimodal and included live satellite images, live video streaming of meetings, and websites, articles, and photos. Thus, the links contained a high percentage of nonprint text. This variation in modality, genre, and structure made for an intriguing textual pastiche. The interactive nature of Twitter, coupled with the novice-friendly features, further enhanced the possibility for this text to be engaging to adolescents.

## Implications for Teaching

Gaining a better understanding of the structure of NASA's Twitter site can help classroom teachers see scientific text and content area literacy from a broader perspective, one that includes social media as disciplinary text. Twitter brings together student engagement in reading and composing through social media with elements of disciplinary literacy in science, such as the importance of recent research in establishing credibility (Shanahan & Misischia, 2011). Twitter can also be used to create a bridge to reading other forms of primary scientific literature that students may find less accessible.

Similarly, the participatory features of social media like Twitter increase the possibility that adolescents will find the tweets and linked multimodal text to be more engaging than a traditional textbook (Guzzetti, 2009). Although "textbooks have been criticized specifically for their inability to effect conceptual change" in students' understanding of science, teachers must be vigilant that more engaging texts such as Twitter also foster appropriate comprehension (Guzzetti, Snyder, & Glass, 1992, p. 642). Teaching how to read and post tweets will hinge on an understanding of audience that is constructed through the inclusion of multiple points of view and technical knowledge of the field. Such instruction also supports the following Common Core English language arts standards for science and technical subjects (National Governors Association Center for Best Practices & Council of Chief State School Officers [NGA & CCSO], 2010):

1. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context.
2. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually.

The technical context and number of visual texts linked to the Twitter posts can provide interactive materials for teachers to use to address these standards.

The NASA Twitter site holds the potential to involve adolescents in real-world science applications. Given the novice-focused tone of the tweets, the participatory nature of Twitter, and the multimodal links, NASA's Twitter site can be used to teach adolescents much about scientific content and literacies. In addition, teachers can offer instruction about the unique social media characteristics of this genre, such as adopting a professional persona, respectfully debating a controversial topic, synthesizing ideas, and managing inquiry. Through Twitter, students can respond to tweets and join in a dialogue about climate change, ask questions to astronauts and world-renowned astrophysicists, and view components of conducting scientific research as it occurs in real time. All these experiences represent opportunities to foster understanding of scientific literacy, to encourage scientific inquiry with an audience beyond the reach of the immediate classroom, and to develop a discursive identity as a scientist for adolescents who more than likely hold many misconceptions about science and are disinclined toward reading a science textbook. Becoming followers of NASA exposes adolescents to a mentor text that allows them to emulate the voice of a scientist (Brown, Reveles, & Kelly, 2005).

The content analysis revealed the potential of Twitter to engage students in scientific learning. However, much more research is needed to investigate the plausibility of following NASA's Twitter page for the purpose of scientific learning. Classroom applications

## Take Action

STEPS FOR IMMEDIATE IMPLEMENTATION

1 Follow scientific organizations on social media sites. A few that I recommend are NASA and NOAA (National Oceanic and Atmospheric Administration) on Twitter and "The Universe" on Facebook.

2 To support the Common Core State Standards (NGA & CCSO, 2010) goal of developing disciplinary literacies, incorporate Twitter posts and Facebook updates from science sites as texts in your instruction and teach the text genre and structure along with the content of these posts.

3 Generate collective questions as a class and ask these questions to experts on science social media sites. Have students analyze responses in light of their own scientific knowledge and reasoning.

4 Create a class Twitter account and have students practice microblogging about scientific inquiry they engage in.

with Twitter need to be examined in secondary science classrooms. More precisely, studies need to be conducted that examine student engagement with NASA tweets, student comprehension of linked text to the tweets during independent reading, whether such interactions can shift high school students' faulty perceptions about scientific concepts, and the extent to which Twitter fosters students' identity formation as budding scientists.

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## More to Explore:

CONNECTED CONTENT-BASED RESOURCES

- View the film "A Private Universe" at the Annenberg Learner website at www.learner.org/resources/series28.html?pop=yes&pid=9#. The film is an examination of persistent scientific misconceptions held by students.
- View the video "A Private Universe 20 Years Later" at the Annenberg Learner website at www.learner.org/resources/series28.html?pop=yes&pid=9#. The video shares behind-the-scenes information about the creation of the film and demonstrates the enduring relevance of the film.
- Check out other participatory media venues for science education, such as "The Moon Project," an international science education initiative at murcha.wordpress.com.
- Review the National Science Education Standards at www.nsta.org/publications/nses.aspx.
- Review the Common Core State Standards for literacy in history/social studies, science, and technical subjects at www.corestandards.org/ELA-Literacy/RST.