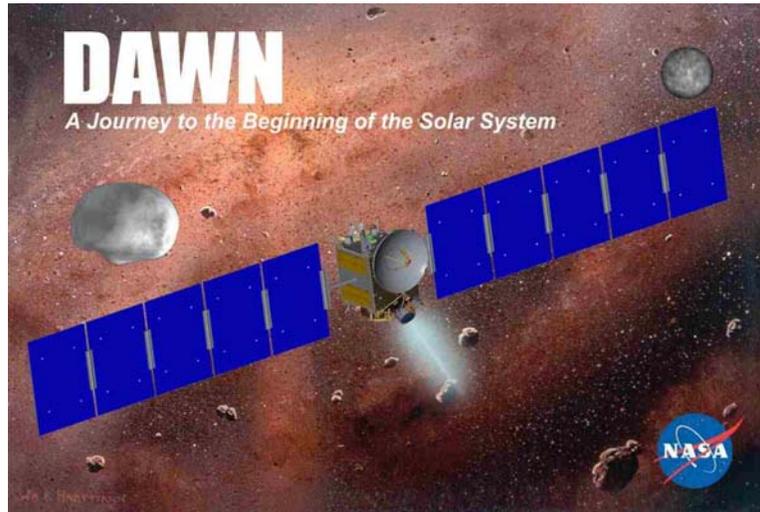


**DAWN MISSION EDUCATION AND PUBLIC OUTREACH:
FOURTH ANNUAL EVALUATION REPORT
JULY 2007–JULY 2008**



Submitted to
Dawn E/PO Team

Submitted by
Magnolia Consulting, LLC



December 18, 2008

Cover credit: Background painting, "A cocoon nebula, perhaps the primordial solar nebula" by William K. Hartmann. Courtesy of UCLA.

ACKNOWLEDGEMENTS

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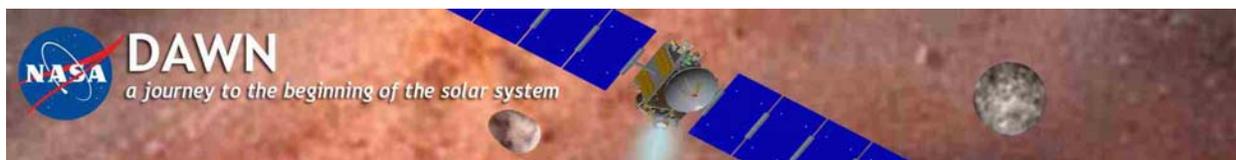
TABLE OF CONTENTS

INTRODUCTION.....	1
The Dawn Education and Public Outreach Initiative	1
EVALUATION DESIGN.....	2
Evaluation Questions	3
Data Collection	3
FINDINGS	4
Developing and Disseminating High Quality Products and Services	4
Reaching and Impacting Students	17
Reaching and Impacting Formal and Informal Educators	23
SUMMARY	26
RECOMMENDATIONS	27
APPENDIX A.....	28
Logic Model for Dawn Delivery and Communication Components	29
Logic Model for Dawn Education Development Component.....	30
Logic Model for Dawn Evaluation Component	31
APPENDIX B.....	32
Evaluation Matrix.....	32
APPENDIX C.....	33
E/PO Team Members' Response to Report Recommendations.....	34

LIST OF FIGURES

Figure 1: Delta II rocket carrying the Dawn spacecraft at liftoff.....	1
Figure 2: Dawn E/PO product development and quality assurance process	6
Figure 3: Locations of formal and informal field-testing of the <i>Find a Meteorite</i> tool.....	7
Figure 4: An educator and his students explore meteorites using the FAM tool.....	8
Figure 5: The percentage of educators agreeing or strongly agreeing with quality and utility statements regarding the <i>FAM</i> activity	9
Figure 6: Quantities of hard-copies materials disseminated to target audiences.....	10
Figure 7: The ten most frequently viewed pages on the Dawn Web site, July 2007-July 2008	11
Figure 8: The ten most frequently viewed PDF pages on the Dawn Web site, July 2007-July 2008	12
Figure 9: Web users' method of accessing the Dawn Web site	12
Figure 10: Survey respondents' method of accessing the Dawn Web site	13
Figure 11: Percent of respondents who agreed or strongly agreed with statements about the Dawn Web site.....	13
Figure 12: Percent of respondents reporting that the Web site was somewhat useful or useful	14
Figure 13: Percent of respondents reporting increased interest and understanding because of viewing the Dawn Web site.....	15
Figure 14: Percent of respondents agreeing or disagreeing that they would recommend the site to colleagues.....	15
Figure 15: Percentage of respondents rating the Dawn Web site as good or excellent.....	15
Figure 16: Resources respondents would like to see more of on the Dawn Mission Web site.....	16
Figure 17: Mean ratings for students' level of agreement with statements regarding their interest	18
Figure 18: Mean ratings for students' level of agreement with statements regarding their engagement in <i>FAM</i> activities.....	19

Figure 19: Mean ratings for students' level of agreement with statements regarding their learning	20
Figure 20: Mean ratings for students' level of agreement with statements regarding their understanding related to <i>FAM</i> activities.....	21
Figure 21: Mean ratings for students' level of agreement with statements regarding their understanding of science.....	22
Figure 22: Percentage of students who rated the <i>FAM</i> tool as good or excellent.....	22
Figure 23: Educators review Dawn education materials during a workshop.....	23
Figure 24: A Dawn E/PO team member facilitates an educator workshop	24
Figure 25: Participant ratings of aspects of workshop quality	25



INTRODUCTION

As part of its Discovery Program, NASA awarded funding for the Dawn Mission in December 2001. Dawn, the first mission to the Main Asteroid Belt, investigates Ceres and Vesta, two of the largest protoplanets remaining intact since their formation. The mission addresses the role of size and water in determining the evolution of the planets by measuring their mass, shape, volume, and spin rate with imagery and gravitational analysis of the spacecraft motion. Through this investigation, scientists aim to characterize the conditions and processes of the solar system's earliest epoch.¹ The Dawn Mission offers a variety of information and data for the informal and formal educators as well as the public:

It [Dawn] brings images of varied landscapes on previously unseen worlds to the public including mountains, canyons, craters, lava flows, polar caps, and, possibly, ancient lakebeds, streambeds, and gullies. Students can follow the mission over an entire K–12 experience as the mission is built, cruises to Vesta and Ceres, and returns data.²

Dawn began its trek with a successful launch on September 27, 2007 (Figure 1). The craft will travel four years before it reaches Vesta and another four years to reach Ceres with an end-of-mission date of 2015.



Figure 1. Delta II rocket carrying the Dawn spacecraft at liftoff on September 27, 2007.

THE DAWN EDUCATION AND PUBLIC OUTREACH INITIATIVE

Dawn E/PO consists of a national team of Education and Public Outreach (E/PO) specialists from the University of Maryland, New Roads School (CA), and Mid-continent Research for Education and Learning (McREL) that develop and disseminate high quality educational resources and materials in support of NASA's Dawn Mission. Dawn E/PO delivers emerging technology and scientific knowledge to the public, to classroom teachers and students, and to informal educators and participants. Through the Dawn E/PO Web site, students, educators, and the public engage in age-appropriate mission activities that include, for example, analyzing images for cratering, doing photometry on images to produce light curves, and discussing with mission scientists the importance of Vesta and Ceres to our understanding of solar system origins. Dawn E/PO concurrently uses innovative, educational tools to encourage student collaboration, visualization, and peer review in ways that conform to and further define the national standards in math and science education.³

Target Audiences

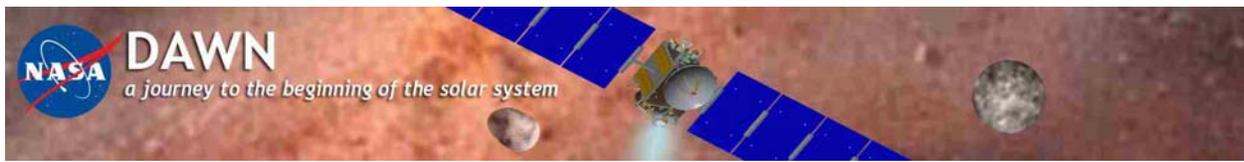
Dawn's target audiences include a) educators (teachers and students, K–Post Secondary); b) general public members (businesses, parents, politicians, adult learners, and retirees); c) media journalists⁴ (national and local, broadcast, print, trade publications, Internet, instructional TV, radio, and public service announcements); d) informal educators (science museums/centers, arts community, speakers bureaus, youth programs, and service clubs); and e) disadvantaged and underserved populations.

¹ Dawn: A Journey to the Beginning of the Solar System (2002). The online site for the Dawn Mission. Retrieved from the World Wide Web, June 5, 2003, <http://www-ssc.igpp.ucla.edu/dawn/>

² Dawn Science Web site: <http://www-ssc.igpp.ucla.edu/dawn/>

³ Excerpt from the Dawn Mission E/PO final proposal, July 21, 2000.

⁴ Media requests are deferred to JPL media relations; however, Dawn E/PO provides press packets and resources for media professionals via the Dawn Mission Web site.



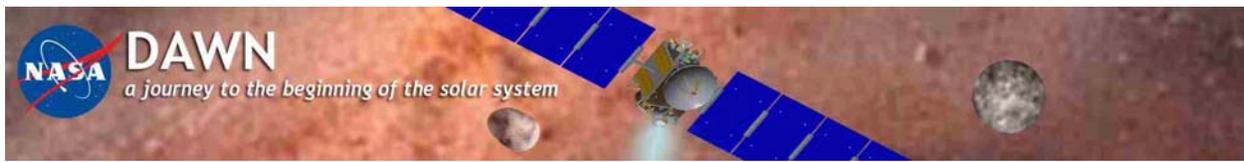
E/PO Approach and Outcomes

The Dawn E/PO team employs a strategic outreach approach, which supports NASA's vision and the Dawn E/PO goals. This approach is based on four components: Delivery, Communication, Education Development, and Evaluation. In conceptualizing its work based on the four components of the outreach model, the E/PO team identified eight, long-term ultimate outcomes, which are supported by seventeen intermediate outcomes. Logic models were created to illustrate the activities, intermediate outcomes, data collection methods, and ultimate outcomes for each component (refer to Appendix A). The following lists the eight ultimate outcomes:

1. E/PO efforts reach broad target audiences through high quality products and dissemination mechanisms. Primary contacts share what they learn about the Dawn Mission and associated science with their colleagues.
2. As a result of the knowledge and skills obtained from Dawn E/PO products and activities, participants have a better understanding of the formation of the solar system.
3. As a result of using Dawn E/PO products and activities, participants are interested in solar-system science.
4. Students will conduct science within a real-life context leading to increased academic achievement.
5. Educators have a better understanding of how to implement inquiry processes leading to improved practices.
6. Dawn E/PO products and services are of high quality and utility because they reflect audience needs.
7. Dawn E/PO can demonstrate the effectiveness of its outreach as evidenced by the impacts of its high quality products and activities.
8. Future mission E/PO efforts will have a blueprint from which to make informed decisions based on extensive documentation of lessons learned from Dawn E/PO.

EVALUATION DESIGN

The evaluation emphasizes a collaborative approach to evaluation, which requires the active participation of E/PO program staff in the design and implementation of the evaluation work. The evaluation design includes both qualitative and quantitative methods in order to provide meaningful formative and summative information. Formative evaluation information provides feedback to project staff, which is intended to guide project planning and development, and allows for a continuous reflective process throughout project implementation. Summative evaluation information addresses the progress made toward intended outcomes of the outreach effort with a description of how the desired outcomes were realized. Furthermore, logic models were developed as a tool for defining and depicting how project activities connect to project intermediate and ultimate outcomes.



EVALUATION QUESTIONS

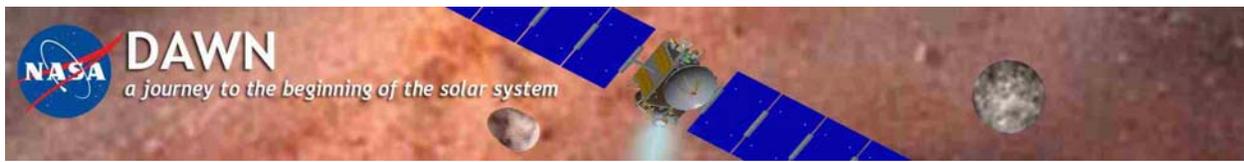
There are seven key evaluation questions, which link to E/PO intended project outcomes and are supported by additional evaluation questions, information sources, and data collection methods (see Appendix B for the Evaluation Matrix). The following key evaluation questions focus on impacts of the outreach initiative on the public, teachers, and students, as well as the quality and utility of materials and resources.

1. Do users of the Dawn E/PO products and services perceive them to be of high quality and utility?
2. To what extent do formal and informal educators and students access and use the Dawn E/PO materials and resources?
3. To what extent do public members access and use the Dawn E/PO materials?
4. Are participating students engaged and interested in the Dawn Mission science as a result of using E/PO materials?
5. Do participating students have an increased understanding of the formation of the solar system?
6. To what extent has the Dawn E/PO effort enhanced participating teachers' capacity to teach space science?
7. To what extent has the Dawn E/PO effort affected public interest in and understanding of the Dawn Mission?

DATA COLLECTION

The evaluation design encompasses both qualitative and quantitative methodology and, in some cases, more than one data collection method is used to address a given evaluation question in order to strengthen the credibility of the findings. Evaluators conduct pilot- and field-testing of educational materials in order to provide E/PO team members with formative and summative evaluation information regarding implementation and impacts on target participants. Data collection methods include pilot- and field-test instrumentation for educators and students, Web statistics, workshop participant feedback forms, Web-based surveys, and dissemination data. Evaluation instruments employed during this reporting period include the following:

- Dawn Web site survey. This 12-item online survey is intended for anyone who visits the Dawn Web site and wants to provide feedback regarding its quality and utility.
- Dawn Module Evaluation. This online survey is for formal and informal educators who field-test a Dawn education module or activity. This six-page survey collects in-depth information from educators regarding their implementation of the module, their perception of its quality and utility, and any changes in instructional practices and student learning.
- Formal education student survey. This paper-based survey is for students in pilot- and field-test classrooms. Students are asked to respond to items about the Dawn classroom materials and any impact they had on students' interest and learning.
- Informal user survey. This survey is for students and any others who participate in Dawn activities in informal education settings. This brief 10-item survey is available in hard copy or online to accommodate various implementation settings.
- Workshop participant feedback form. This paper-based form is for formal and informal educators who participate in Dawn professional development opportunities, such as conference presentations and workshops. Participants are asked to provide feedback on the quality and utility of the professional development as well as any effects that it had on their awareness and interest in the Dawn Mission.



Evaluation activities during the reporting period included data collection and analysis of the pilot- and field-testing for the *Find a Meteorite* (FAM) tool in informal and formal education settings. Also during this period, evaluators developed teacher and student data collection instruments for a preliminary pilot-test of the second E/PO content module, *Ion Propulsion*. Evaluators conducted a field test with one teacher during spring of 2008. Building on pilot-test feedback, evaluators recruited for and launched a field study of the *Ion Propulsion* module for fall of 2008. The findings presented in this report are based on the results of the FAM pilot- and field-testing. Evaluators will present findings from the *Ion Propulsion* pilot- and field-test as part of the 2009 annual reporting cycle.

FINDINGS

This reporting period, July 2007 to July 2008, marks an exciting year for E/PO with the launch of the Dawn spacecraft on September 27, 2007. E/PO team members were active in all aspects of outreach, including coordination of launch education activities, Web site updates, Web site content development and design, material production, and outreach dissemination. This section presents findings related to key evaluation questions and is organized into the following sections: Developing and Disseminating High Quality Products and Services, Reaching and Impacting Students, and Reaching and Impacting Formal and Informal Educators.

DEVELOPING AND DISSEMINATING HIGH QUALITY PRODUCTS AND SERVICES

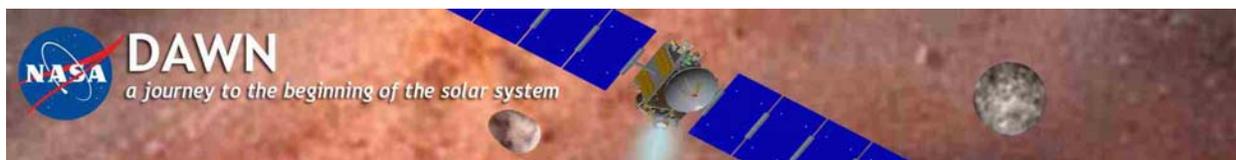
The Dawn E/PO team develops and disseminates a variety of mission-related products and services to target audiences. E/PO products undergo a rigorous review process that includes expert review, pilot- and field-testing, and multiple revision periods. E/PO products include educational materials for a variety of target audiences and are disseminated primarily via the Web site, professional conferences, formal and informal educational settings, and public E/PO engagements. E/PO services include professional development workshops, conference presentations, Web site development, and information dissemination. This section presents development and dissemination information about the different E/PO products and services and describes how team members ensure their quality and utility. In addition, there is special emphasis on the quality and utility of the curriculum materials and activities based on feedback from pilot- and field-test participants.

Ultimate Outcomes

1. E/PO efforts reach broad target audiences through high quality products and dissemination mechanisms.
6. E/PO products and services are of high quality and utility because they reflect audience needs.

Key Evaluation Questions

1. Do users of the E/PO products and services perceive them to be of high quality and utility?
2. To what extent do informal and formal educators and students access and use the E/PO products and services?
3. To what extent do public members access and use the E/PO products and services?



Product Development

The Dawn E/PO team specializes in translating mission science into educational learning opportunities for students and general public members. The E/PO educational materials include Web-based information and resources as well as supplemental curriculum materials and activities for formal and informal educators and students. To date, the E/PO team has developed two content modules, *History and Discovery of Asteroids* and *Ion Propulsion*, and three supplemental activities, *Find a Meteorite (FAM)*, which is described below, *Career Connections*, and the dwarf planet activity.

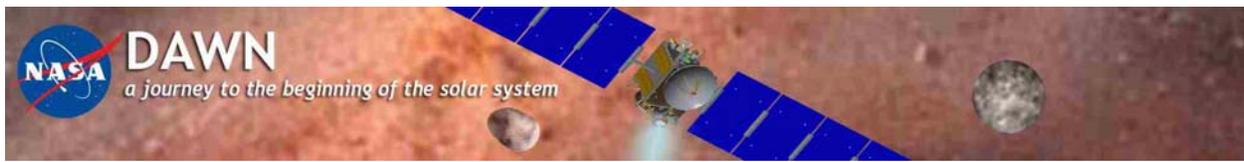
The *History and Discovery of Asteroids* content module is intended to engage middle school learners in the wonder and curiosity that is inherent in discovery. Participants explore the historical sequence of events that led to the Dawn Mission. The module provides a real-life example that allows students to experience science and science thinking over time, from the discovery of asteroids and the asteroid belt to the new science and discovery that is part of the Dawn Mission. The module includes teacher guides and student activities as well as vignettes that provide historical snapshots of the discovery of asteroids, the technology used or developed, and the social and political issues at the time. The content module consists of inquiry-based learning materials that guide students through a five-phase learning cycle. The module is aligned with the *National Science Education Standards*⁵ and the American Association for the Advancement of Science benchmarks for science education.⁶ The module is available online and enables users to search and access different components within the model according to their instructional needs. An Independent Learner Guide and an Informal Leader Guide also were developed in order to provide broader target audiences with an appropriate format for engaging in the module's activities. This product has completed pilot- and field-testing as well as final revisions and therefore, evaluation results for this module are not included in this report.

The *Find a Meteorite* activity introduces the importance of meteorites in understanding the origin of the solar system. Since scientists believe that some meteorites are pieces of the asteroid Vesta, they may be very old remnants of the solar system in its earliest stages. The activity provides information and insight that allows participants to share scientists' expectations, based on meteoritic samples, of what we will find when NASA's Dawn Mission visits Vesta and Ceres. Comparison between actual data and the meteorites here on earth may confirm that we are in possession of very valuable material indeed. The hands-on activity is an introduction to meteorite identification that aims to help learners differentiate between meteorites and terrestrial rocks. During the project period, all components of the FAM activity were pilot- and field-tested in formal and informal settings. The findings are presented in this report.

The second E/PO content module entitled *Ion Propulsion* focuses on concepts of ion propulsion and challenges high school students to consider the guiding question: "How do we get to the asteroid belt?" The activities provide students with the opportunity to learn about both conventional propulsion systems as well as the ion propulsion system utilized by the Dawn Mission. By comparing the different systems, students recognize the limitations of conventional propulsion systems and realize why there has not been another mission to the asteroid belt prior to Dawn. As the module unfolds, students develop their background knowledge of Newton's Laws and Coulomb's Law through readings, hands-on activities, discussions, an interactive simulation, manipulation of data, or exploration of resources. Equipped with an understanding of these physical science concepts, students then experiment with a computer-based ion propulsion simulation developed at the Jet Propulsion Laboratory as part of the Next Generation Ion

⁵ National Research Council. (1996). *National science education standards*. Washington DC: National Academy Press.

⁶ American Association for the Advancement of Science. (1993). *Benchmarks for science literacy: A tool for curriculum reform. Project 2061*. Cary, NC : Oxford University Press.



Engine program. In subsequent sections, students synthesize their knowledge and, ultimately, demonstrate their learning relative to the standards addressed in the module. During the project period, E/PO staff finalized various module components including a PowerPoint presentation, an ion propulsion interactive simulation, student texts, teacher guides, and student assessment activities. *Ion Propulsion* was pilot-tested with one teacher during spring of 2005 and will be field-tested in high school classrooms during the spring and fall of 2008.

McREL instructional materials developers have designed lessons for the *Dawn Instrumentation* module (CM #3) during the past year. The materials in this module will introduce students to the ways that scientists, engineers, and technologists “in the real world” design instrumentation that utilize the *interactions* between different frequencies/wavelengths of electromagnetic radiation (EMR) and matter to make scientific measurements and analyze data. Development of the module has involved 1) identifying relevant standards, 2) designing the learning cycle, 3) developing teacher guides and activities for the briefing and exploration sections, and 4) developing fact sheets and image sheets for each of the instruments. The team also developed a beta interactive simulation for a Gamma Ray and Neutron Detector interactive simulation appropriate for educators and the public. Team members presented the briefing materials and some of the fact sheets for core planning team feedback at state level National Science Teachers Association conferences in Kansas and Colorado.

Rigorous Quality Assurance Review

The Dawn E/PO team has designed and implemented a product development and quality assurance process that includes initial peer and expert reviews, pilot- and field-testing in multiple sites, and iterative revising (see Figure 2). This development process ensures that the Dawn E/PO products are appropriate for the intended educational settings; meet the needs of students and educators; impact the knowledge, skills, and interests of participants; and are of high quality and utility to users. Each E/PO formal and informal education product goes through this process before finalization and broad dissemination.

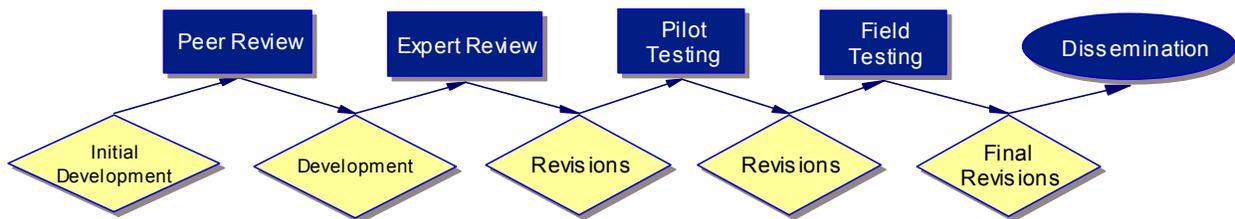
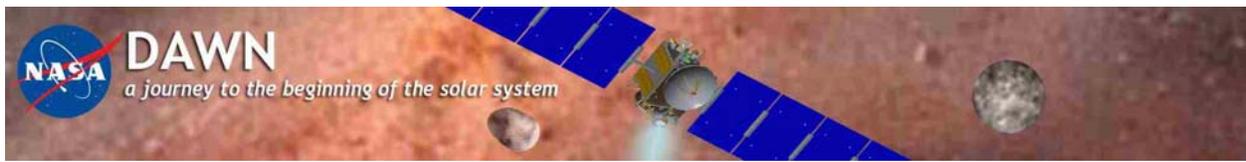


Figure 2. Dawn E/PO product development and quality assurance process.

The purpose of the peer review sessions is to present product components to educators in order to collect initial feedback regarding its quality and utility, such as grade-level appropriateness, potential to create student interest, necessary student experiences and background information, anticipated instructional time, and potential in developing student inquiry skills and understanding of the science concepts. The expert review process provides team members with specific feedback on the scientific and technical aspects of the content of the E/PO materials. The purpose of pilot-testing products is to gain preliminary feedback from a small number of users regarding the appropriateness, fit, quality, and utility of the product. This allows for the identification of issues, challenges, and characteristics regarding the product’s design, content, pedagogy, implementation, and efficacy with students. The purpose of the field test is to study the revised materials in a larger number of settings and to examine the effectiveness of the product in achieving teacher and student goals. The field test also generates important formative feedback, similar to the pilot test, to guide further revisions and modifications. Additionally, before the E/PO products are disseminated broadly to target audiences, they undergo NASA Product Review for approval.



During this project period, the E/PO team facilitated two peer reviews, also referred to as Core Planning Teams, with educators attending the Kansas Association of Teachers of Science (KATS) conference. The peer review sessions focused on specific activities within the instrumentation content module (Content Module #3) and Clickworkers. In total, E/PO team members received peer review feedback from twenty-five participants on these activities.

Six educators across multiple settings completed pilot- and field-testing of the *Find a Meteorite* tool. Those results are presented in the following sections.

User Perceptions of Product Quality and Utility

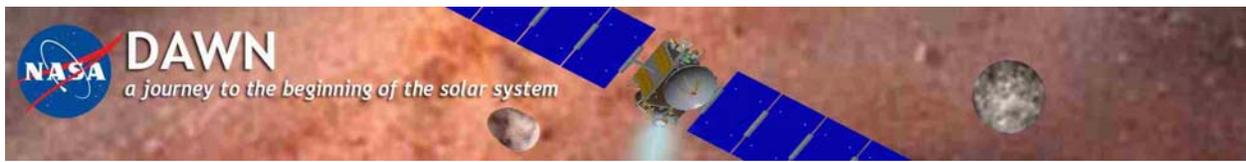
The Find A Meteorite tool was pilot- and field-tested with educators in both formal and informal settings across the country. Formal settings included two middle-school classrooms, one in Arizona and one in Texas. Informal sites included afterschool clubs, museums, libraries, and science centers in multiple locations across California, Colorado, New York, Ohio, Pennsylvania, and Rhode Island. Figure 3 shows the geographic distribution of formal and informal field-test locations.



Figure 3. Locations of formal and informal field-testing of the *Find a Meteorite* tool.

Pilot- and field-test educators used the Find a Meteorite activity with students ranging in age from upper elementary to college level (Figure 4). Pilot- and field-test educators provided in-depth feedback regarding their perceptions of the quality and utility of the *Find a Meteorite* activity via the *Dawn Evaluation Survey* (for formal educators) or a structured interview with items from the survey (for informal educators). All educators agreed that the materials were very useful and of high quality. On a scale of 1 to 7, 1 being “not difficult” and 7 being “very difficult,” educators overall indicated that it was not difficult to adapt the module to their teaching settings ($\chi = 1.60$). One educator thought that implementation would be easier if every student had access to a computer. The two formal educators reported that implementation was easy but indicated that the materials were difficult to obtain. As one teacher commented, “My only challenge really was to get all the materials together, especially the meteorite samples.” It should be noted that Meteorite samples are not required for using the interactive web tool.

100% of educators perceive the Find a Meteorite activity to be very useful and of high quality.



An educator engages in a Dawn learning activity.

When asked about barriers to making better use of the materials in instruction, only one educator identified insufficient time as an issue, and one informal educator, who used the activity during a summer camp, indicated that only parts of the activity were appropriate for third and fourth graders.

100% of educators perceive the content to be scientifically accurate, procedures easy to follow, and the layout of the materials well organized.



Figure 4. An educator and his students explore meteorites using the FAM tool.

Educators indicated the extent to which they agreed or disagreed with several statements regarding the quality and utility of the *Find a Meteorite* activity (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree). Figure 5 presents the percentage of respondents who agreed or strongly agreed with statements related to the activity content and design. Formal educators also responded to items related to the activity's alignment to standards. As shown in Figure 5, all educators agreed that the content is scientifically accurate, procedures were easy to follow, and the layout of the materials was well organized. Both formal educators strongly agreed that the activity's alignment with standards enhanced its utility, and both agreed that this alignment was instrumental in helping students meet those standards. Additionally, the formal educators agreed that the materials included instructional practices for meeting the needs of diverse students and allowed them to engage in ongoing assessment of student learning.

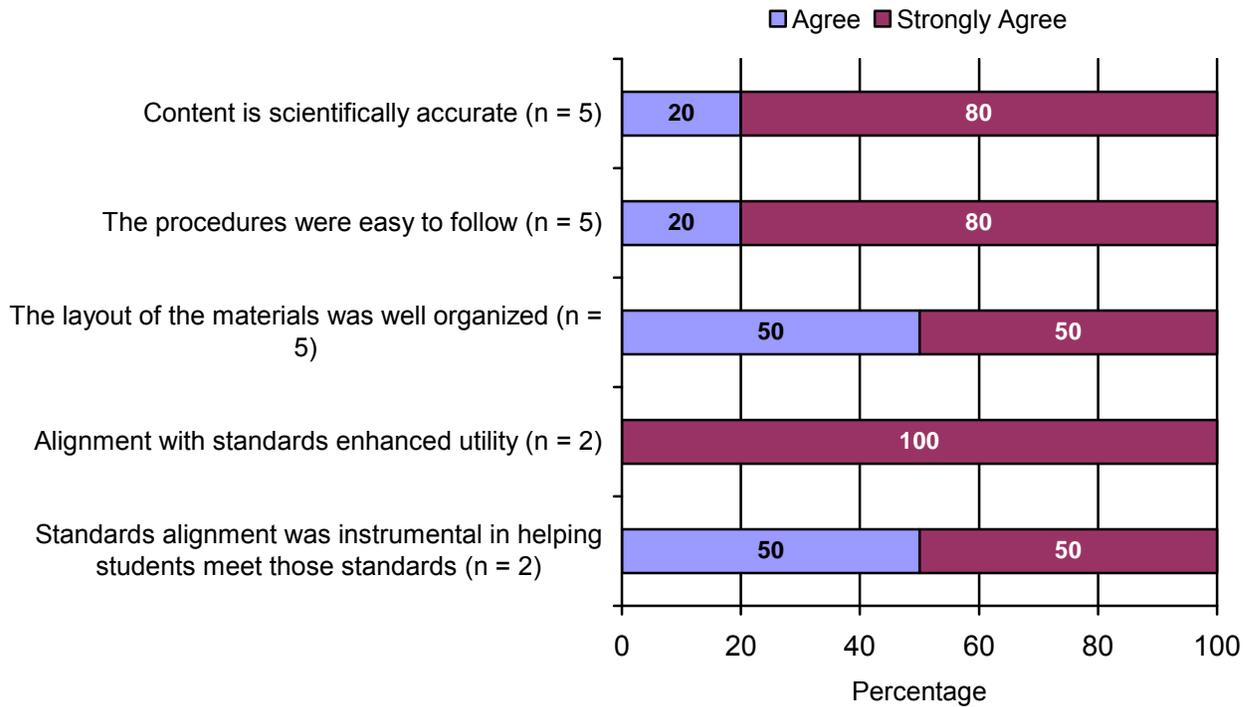
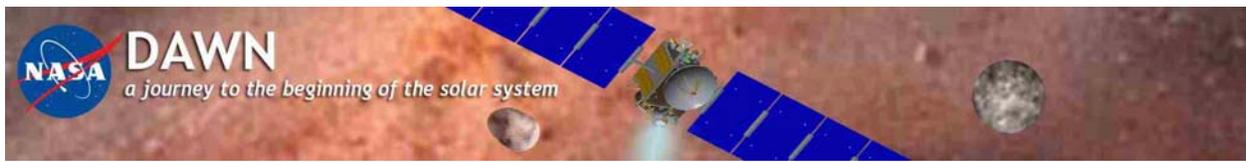


Figure 5. The percentage of educators (n = 5) agreeing or strongly agreeing with quality and utility statements regarding the FAM activity.

Outreach Dissemination and Visibility

E/PO team members disseminate materials and resources ranging from Dawn Mission bookmarks to the Dawn Mission e-newsletter and from mission-related activities for young children to standards-based curriculum modules for teachers and students. Figure 6 presents quantities of hard-copy project materials disseminated during the reporting period.

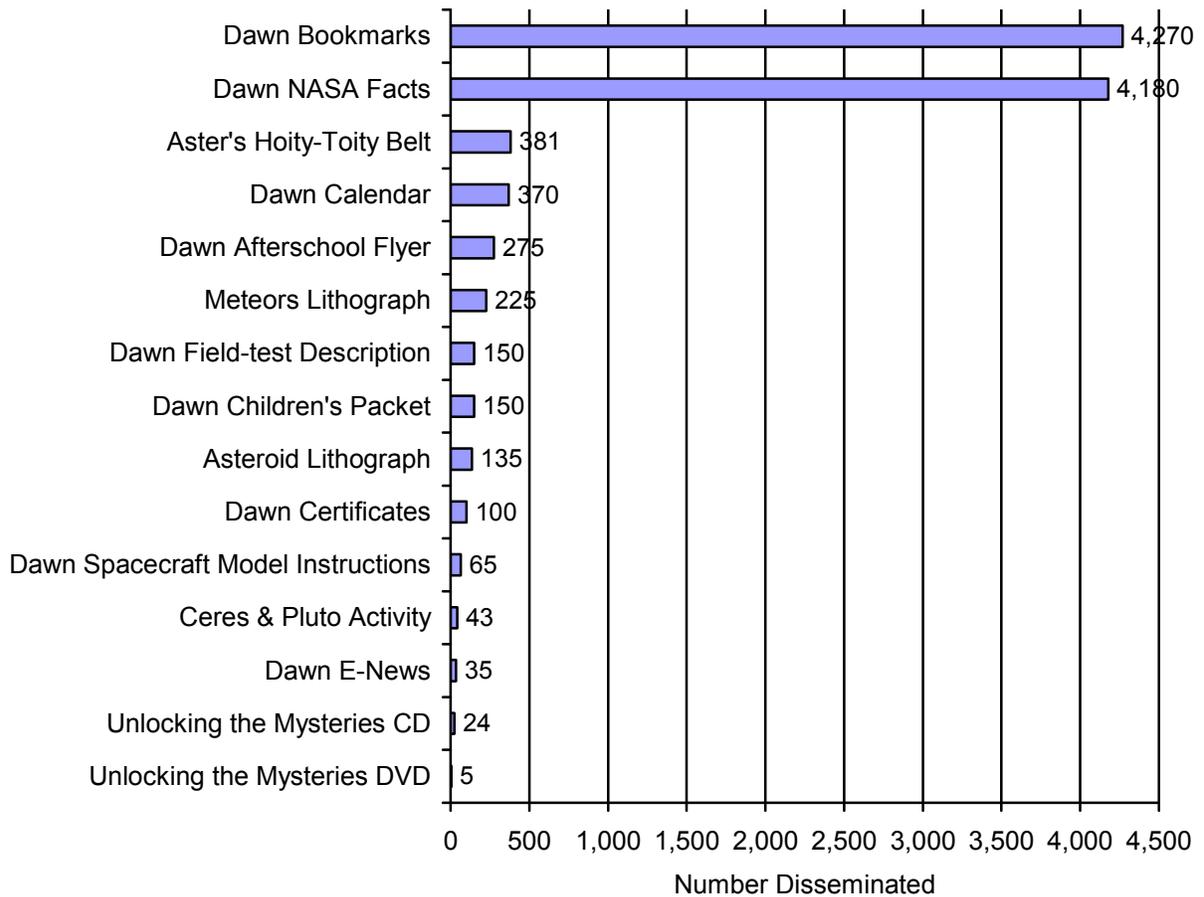
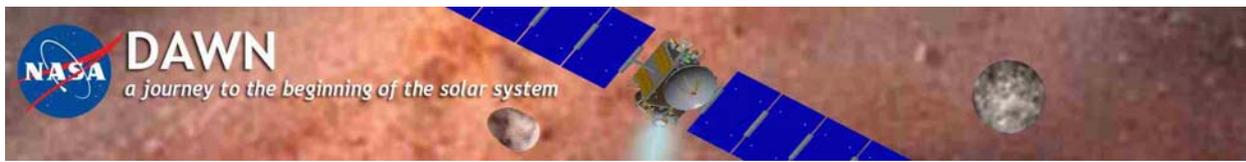
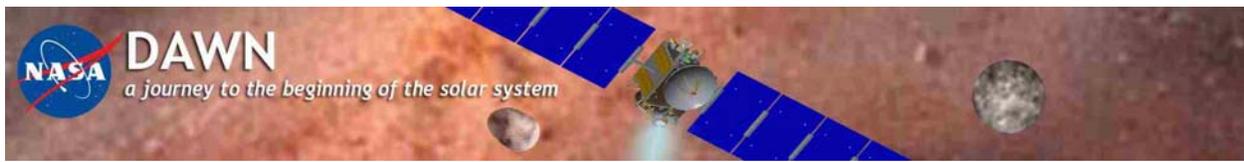


Figure 6. Quantities of hard-copy materials disseminated to target audiences.

From July 2007 to July 2008, approximately 4,200 bookmarks and Dawn fact sheets were disseminated to educators across the country. Also distributed were calendars, lithographs, activities, children's packets, and CDs/DVDs featuring Dawn for NASA's Discovery Program.

During the 2006–2007 reporting period, team members developed and disseminated quarterly Dawn Mission e-newsletters to 2,529 subscribers. The number of e-newsletter subscribers increased to 3,519 during the 2007–2008 reporting period. Subscribers register for the e-newsletter via the Dawn Mission Web site or by completing a subscription form at professional conferences attended by the Dawn Mission E/PO team. Team members developed Dawn Mission videos that are accessible through the Internet search engine Google. Available statistics on one of the videos showed that people accessed the videos approximately 23,000 times during the reporting period.

Additionally, team members wrote an article on the *Find a Meteorite* tool for the effective practice section of the *AfterSchool Review (ASR)*. *ASR* is the official peer-reviewed publication of the National Afterschool Association. The mission of *ASR* is to inform and educate afterschool professionals and advocates about current research and innovative practice in the field. *ASR* is peer reviewed, reaches 10,000 members of the National AfterSchool Association and other advocates and supporters of effective, quality programming for children and youth during their out-of-school time.



Dawn Mission Web Site: Usage Statistics

The Dawn Web site is a comprehensive information source and dissemination mechanism for the Dawn Mission. During the 2007–2008 reporting period, team members made a wealth of updates, additions, and enhancements to the Dawn Web site, including timely mission status updates.

From July 2007 through July 2008, the site received 3,334,494 hits, 934,864 page views, and 12,574 visitor sessions.⁷ Almost all visitors (95 percent) accessing the Web site were from the United States, although there was also a small amount of activity from Europe, China, Australia, and other countries. The majority of sessions (76 percent) lasted less than 30 seconds, 4 percent lasted 2 to 5 minutes, and 13 percent lasted longer than 5 minutes.

Figure 7 shows the ten Web pages that received the most page views of the Dawn Web site during the 2007–2008 reporting period. The Dawn Homepage had the largest number of page views (272,785). The other most visited pages were in the Mission section, including the Mission section entry page (39,888 views), the Where Is Dawn? section (31,314 views), and the Mission Status page (28,486). Education related pages also received large numbers of views including Dawn Kids (12,727 visits) and Dawn Classrooms (9,426).

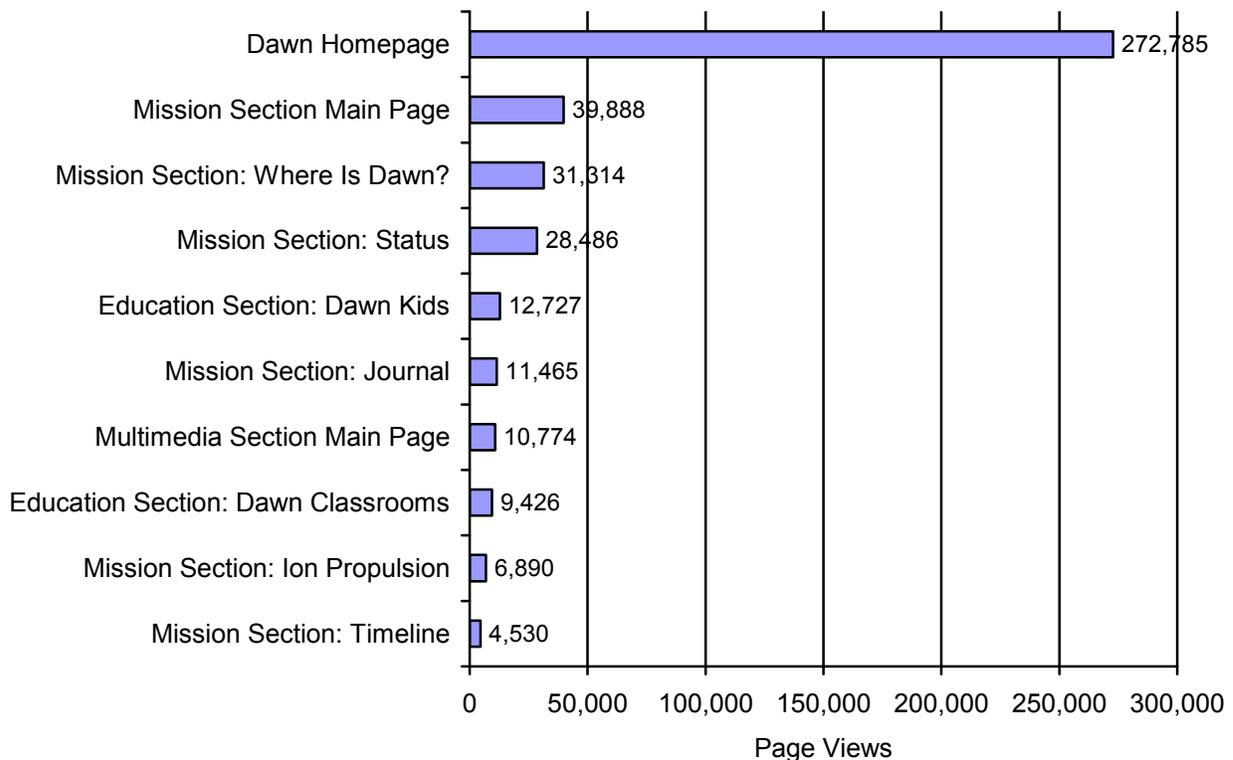


Figure 7. The ten most frequently viewed pages on the Dawn Web site, July 2007–July 2008.

The Dawn Web site offers many PDF documents that can be downloaded by viewers. During the reporting period, the *Mission Fact Sheet* and *A Trip through an Ion Propulsion Engine* were the two most frequently viewed PDF documents, receiving a combined total of over 12,000 views (see Figure 8). Other popular downloads included a spacecraft model pattern, various teacher guides, and student activities and readings.

⁷ A visitor session is a session of activity (all hits) for one visitor of a Web site.

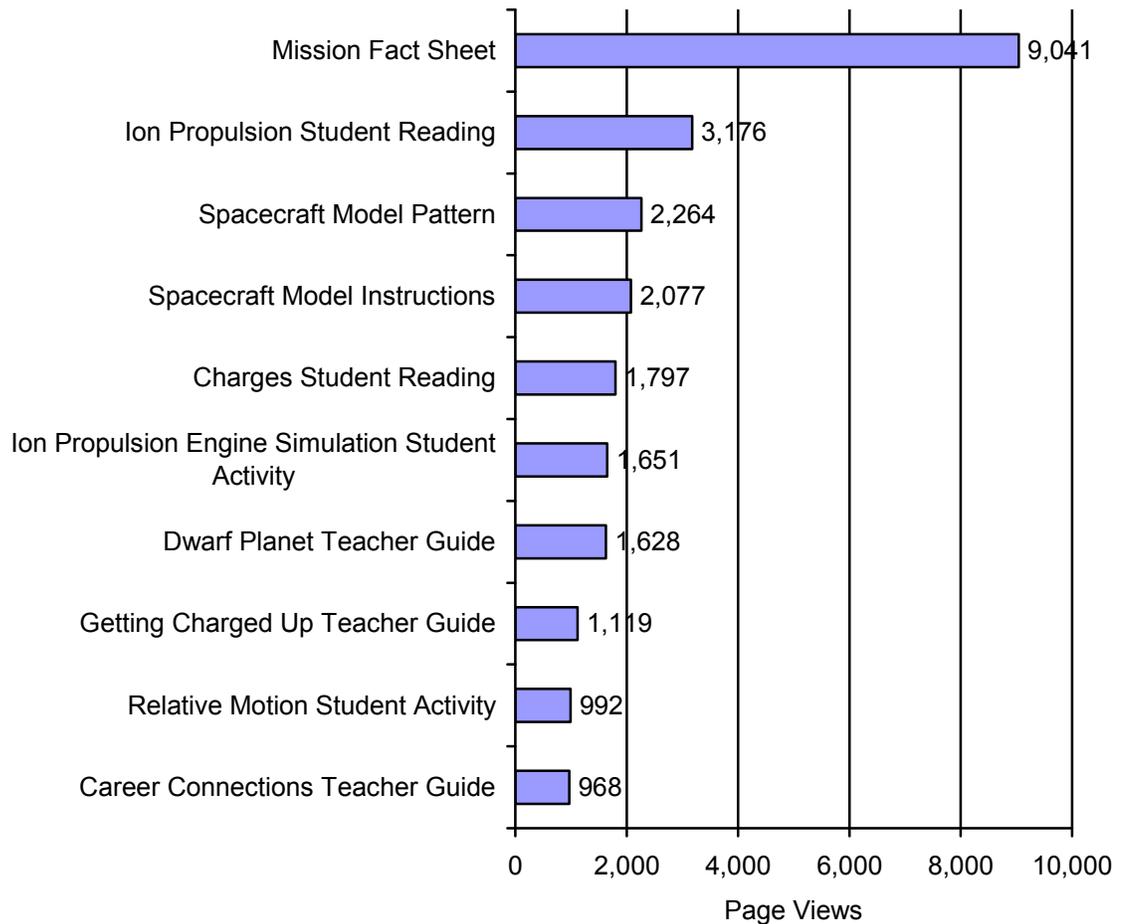
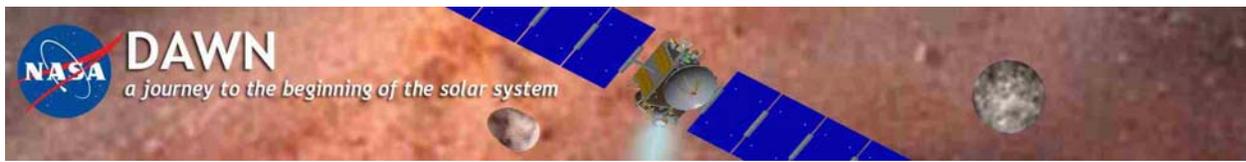


Figure 8. The ten most frequently viewed PDF pages on the Dawn Web site, July 2007-July 2008.

Target audiences can learn about the Dawn Web site through the Dawn e-newsletters; all project materials, which include the Web address; search engines; and links from other space science Web sites. During the study period, the majority (80 percent) of page views originated from another Dawn Web site page. Of page views, 16 percent originated from direct address or bookmarks, and 4 percent from an Internet search engine (see Figure 9).

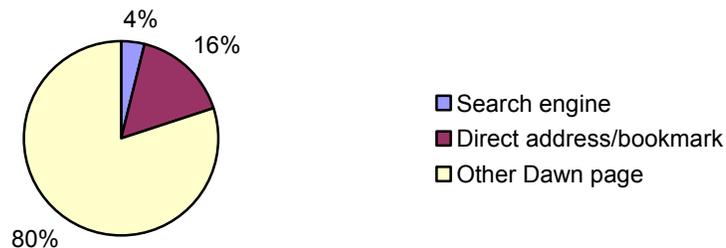
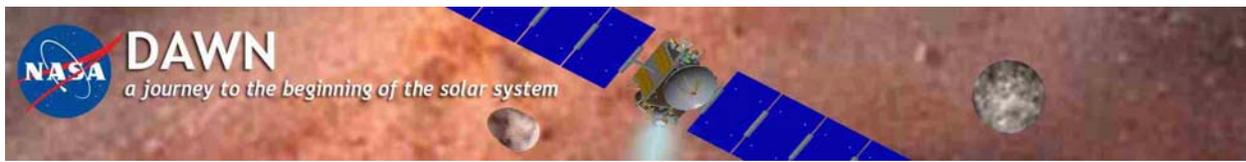


Figure 9. Web users' method of accessing the Dawn Web site.



Dawn Mission Web Site: User Evaluation Survey

The Dawn Mission Web Site Evaluation survey assessed user perceptions of the site’s quality and utility. Of the 177 users who completed the survey during the July 2007 to July 2008 reporting period, 61 percent identified themselves as members of the general public, 11 percent as educators, 15 percent as students, and 7 percent as members of the science community. Of the users, 6 percent did not identify themselves.

Survey respondents indicated how they learned about the Dawn Web site. During the reporting period, half of respondents found the Dawn Web site through a link from another Web page. Thirty-two percent indicated that they learned about the Dawn Web site from other Dawn print materials. Small percentages learned of the Dawn Web site through Dawn Mission business cards (2%), print materials (6%), and the e-newsletter (7%). Those who indicated that they had found the Web site through other means most frequently cited Internet search engines, magazines and newspapers, and teachers or schools (Figure 10).

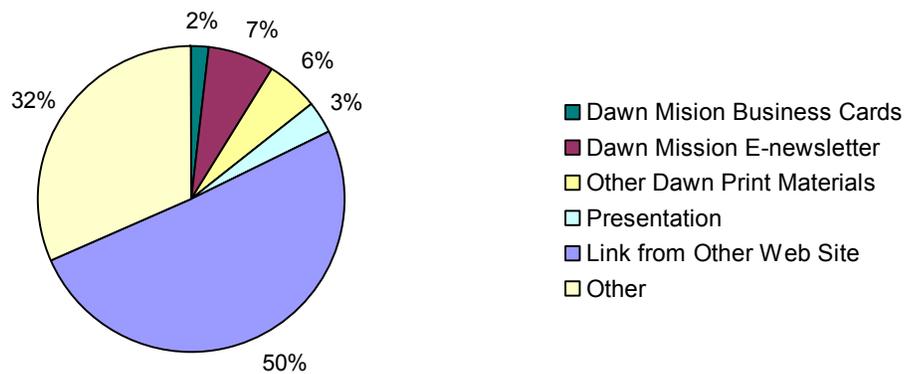


Figure 10. Survey respondents’ method of accessing the Dawn Web site.

The Web site survey contained several questions regarding the utility of the Dawn Web site. Respondents indicated their level of agreement on a five-point scale (5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, 1 = strongly disagree) with statements about organization, ease of navigation, accuracy of content, and usefulness of resources. Figure 11 presents the results for these survey items.

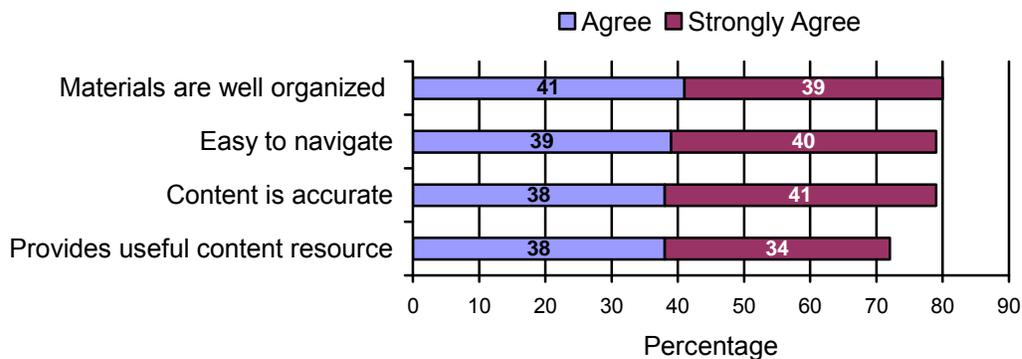
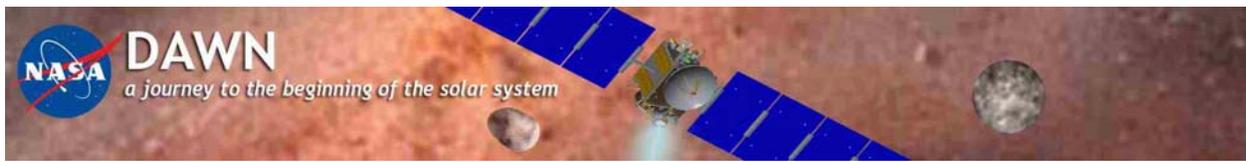


Figure 11. Percent of respondents who agreed or strongly agreed with statements about the Dawn Web site.



As shown in the figure, the majority (80 percent) of respondents indicated that the materials on the Web site are well organized. Of respondents, 79 percent found the site easy to navigate and the content accurate; 72 percent indicated that the site is useful as a resource for Dawn Mission science content.

Respondents replied to a question about the degree to which the Dawn Web site had met their needs. Of respondents, 25 percent indicated the Web site met their needs completely, 36 percent indicated it met their needs mostly, and 20 percent indicated that the Web site had met their needs somewhat.

Respondents also answered questions about the utility of each of the major sections of the Dawn Web site by indicating whether each section was not useful, somewhat useful, or useful. Figure 12 presents these results. More than three-quarters of those who responded to this question found the Mission, Science, and Technology sections of the Web site to be useful. Greater than half of respondents found the Dawn Media and Multimedia sections to be useful.

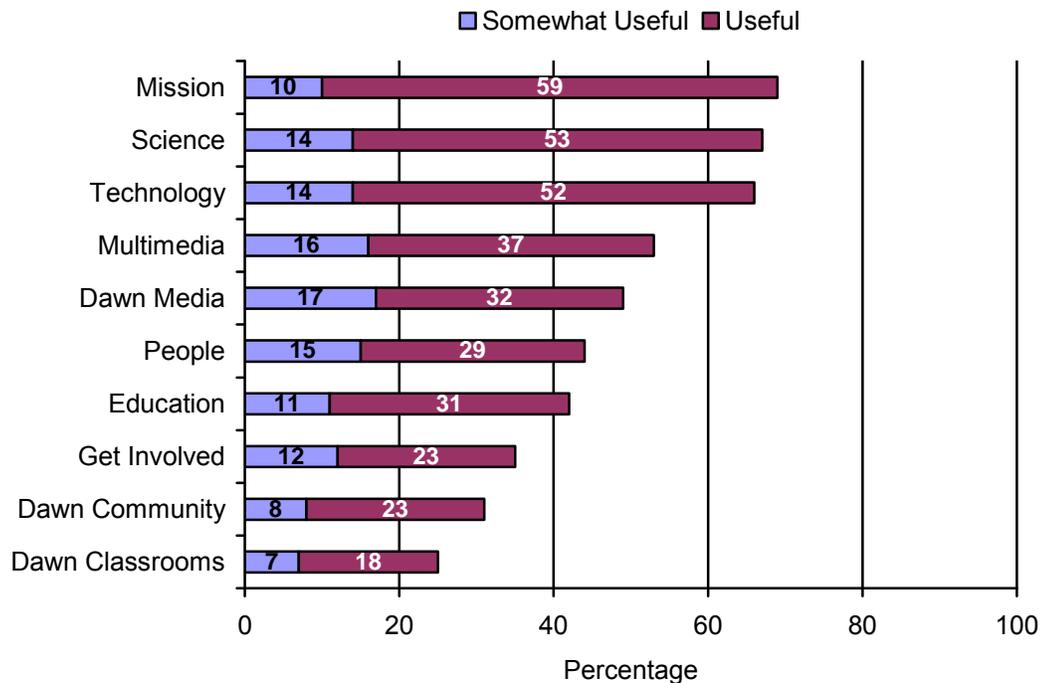


Figure 12. Percent of respondents reporting that the Web site was somewhat useful or useful (n=177).

Survey respondents answered questions regarding how the Web site affected their interest in science and their awareness of science-related content. Figure 13 shows responses to questions related to increased interest in Dawn Mission science content and increased understanding of the formation of the solar system. As shown in the figure, 82 percent of respondents agreed that the Web site increased their interest in Dawn Mission science content, and two-thirds came away with a sense that they understood more about the solar system after looking at the web site.

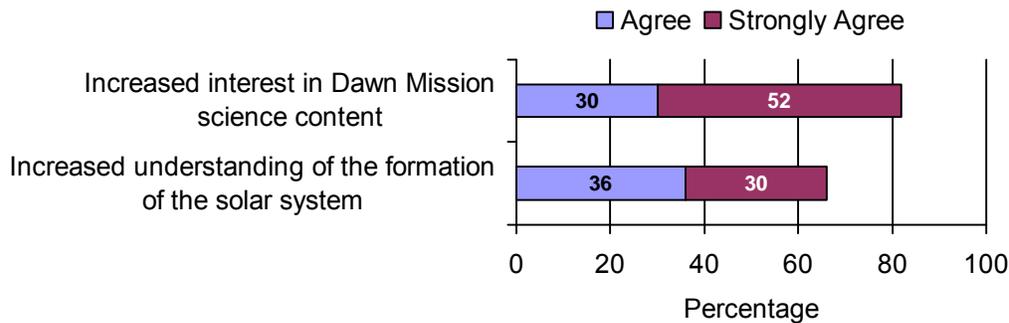
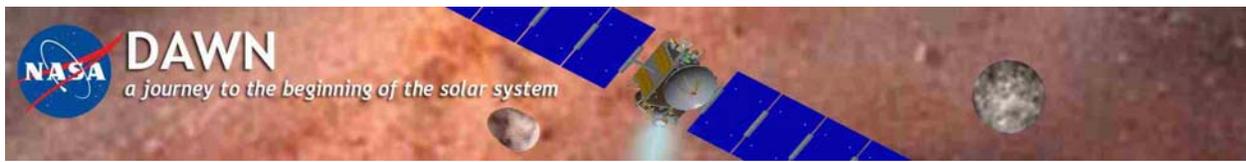


Figure 13. Percent of respondents reporting increased interest and understanding because of viewing the Dawn Web site.

In addition to items related to the quality and utility of the Web site, respondents replied to two questions related to their overall satisfaction with the Dawn Web site. Respondents indicated agreement or disagreement with a statement about whether they would recommend the Web site to others. Of respondents, 87 percent of respondents agreed that they would recommend the site to others (see Figure 14). This is slightly less than in the past reporting period where 93 percent of respondents agreed that they would recommend the site to others.

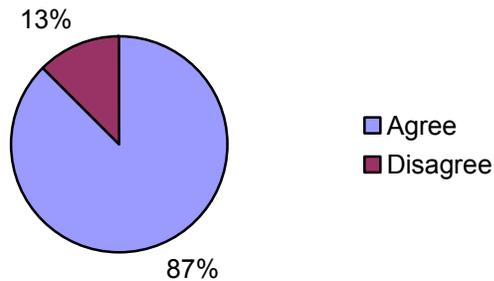


Figure 14. Percent of respondents agreeing or disagreeing that they would recommend the site to colleagues.

Respondents also rated the quality of the Web site on a five-point scale (5 = excellent, 4 = good, 3 = average, 2 = fair, 1 = poor). A majority of respondents (81 percent) rated the Dawn Web site as good or excellent (see Figure 15).

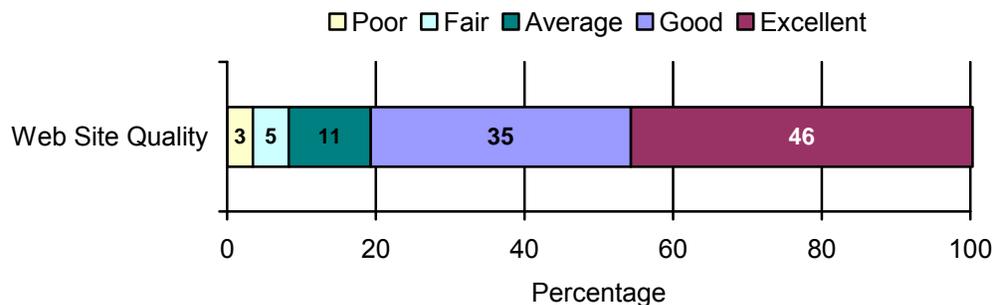
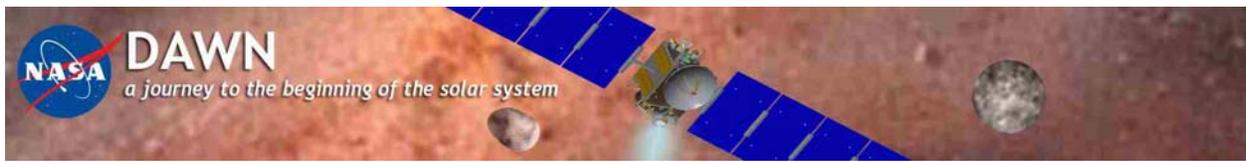


Figure 15. Percentage of respondents rating the Dawn Web site as good or excellent.



Lastly, respondents indicated the types of materials or information they would like more of on the Dawn Web site. Figure 16 presents the results to this question. Respondents chose simulations and interviews most frequently (21 percent and 37 percent, respectively). Thirteen percent of respondents chose “other” materials or information in response to this question and indicated specific things they would like to see. These fell into three broad categories: 1) more media such as video clips, pictures, animations, and “interactive” media; 2) mission-related information such as mission detail, mission facts, mission problems and solutions, and related information on Ceres; and 3) educational information such as real-time data, a “solar system simulator”, and more kid’s activities.

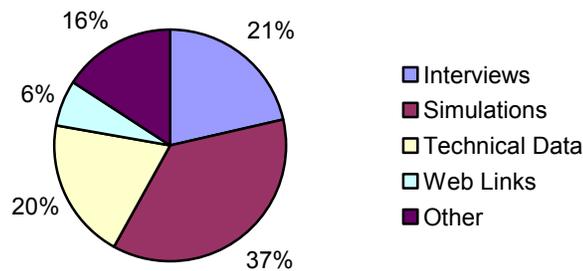
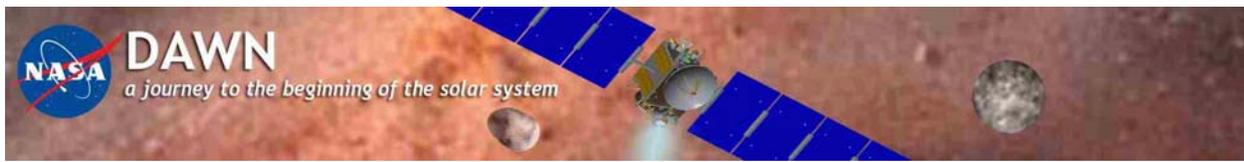


Figure 16. Resources respondents would like to see more of on the Dawn Mission Web site.



REACHING AND IMPACTING STUDENTS

The E/PO team aims to improve student interest and learning in space science by engaging students in high quality, standards-based activities. E/PO team members reach their student audience through teachers, who use the Dawn science materials in their classrooms; informal educators, who facilitate student activities in museum, afterschool, and summer school settings; and independent learners who access the activities on the Dawn Mission Web site.

The Dawn science education materials promote hands-on, inquiry-based learning with activities that allow students to connect classroom lessons to *real life* experiences. Enhancing student awareness of space-science careers is one component of making these *real life* connections. The learning cycle⁸ for each module supports student-initiated learning and facilitates process-oriented, critical thinking skills.

Ultimate Outcomes

2. As a result of the knowledge and skills obtained from Dawn E/PO products and activities, participants have a better understanding of the formation of the solar system.
3. As a result of using Dawn E/PO products and activities, participants are interested in solar-system science.
4. Students will conduct science within a real-life context leading to increased academic achievement.

Key Evaluation Questions

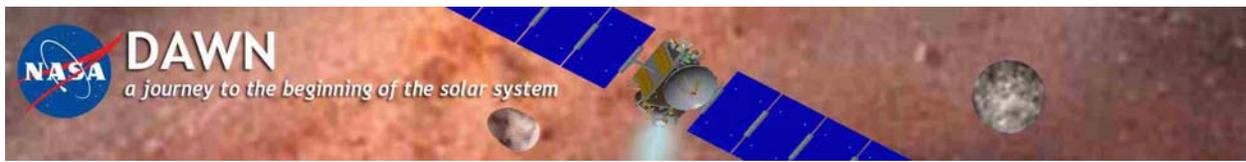
4. Are participating students engaged and interested in the Dawn mission science as a result of using E/PO materials?
5. Do participating students have an increased understanding of the formation of the solar system?

Characteristics of Participating Students in Formal and Informal Education Settings

Two teachers participated in the pilot-test of the *Find a Meteorite (FAM)* content module in formal classroom settings. These teachers implemented the module with 130 students in the sixth and eighth grades. Of the 130 students, 125 completed a student questionnaire providing feedback on the module. Of participating students, 49% were female, and 51% were male.

Informal educators implemented the FAM tool in twelve locations ranging from afterschool clubs to libraries and science centers. One hundred seventy-five students who used the materials in 12 different informal education locations provided feedback on the FAM tool between fall of 2005 and fall of 2007. Student participants ranged in age from 8 years old to college-level with 98% of students ages 10 to 15 years old. Of the students, 76% identified themselves as White, 9% as Black, 7% as Hispanic, 2% as Asian, and 6% as *Other*. Of these students, 50% were female, and 50% were male.

⁸ The learning cycle for each module is divided into the following five components: briefing, exploration, development, interaction/synthesis, and assessment.



Increasing Student Interest in Solar-System Science

Students participating in the pilot-testing in formal classroom settings responded to a series of Likert-scale items (4 = really agree, 3 = agree, 2 = disagree, 1 = really disagree) related to how the *Find a Meteorite* activities affected their interest in science, interest in the science of the Dawn Mission, and their interest in science and space science careers. Figure 17 presents the mean ratings of students' responses to these survey items.

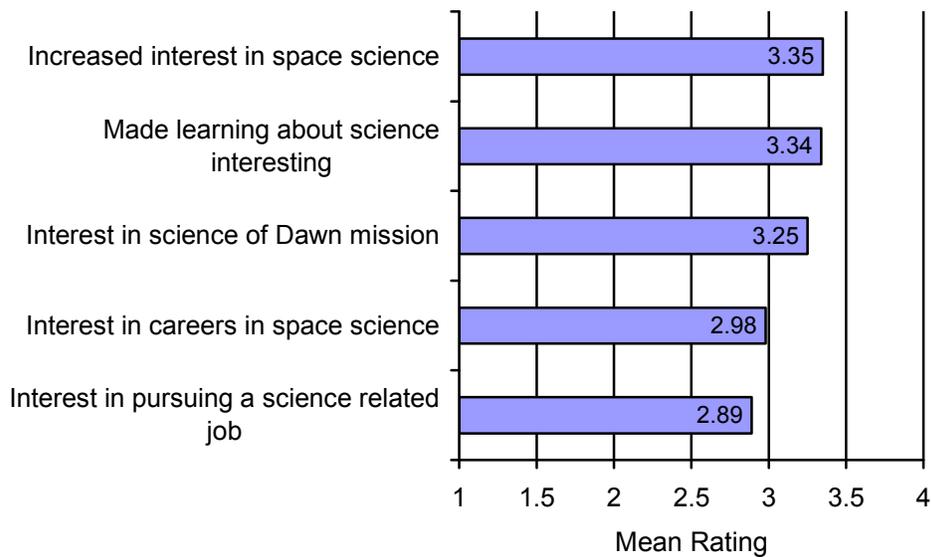


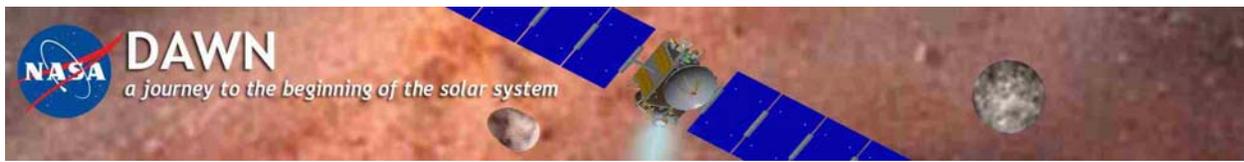
Figure 17. Mean ratings for students' level of agreement with statements regarding their interest (n = 123-125).

Survey results indicate that students had a high level of agreement with statements regarding the effect of the module on their interest in learning about science, in general, and learning about the science of space, in particular. An item on the student survey for informal education settings yielded similar results. In that survey, students agreed that the *Find a Meteorite* activity increased their interest in Dawn Mission science content ($\chi = 4.27$ on a 5-point scale, n = 173). Based on their observations, all educators agreed that students were more interested in science because of participating in the activity.

Students agreed that the Find a Meteorite activity increased their interest in the science content.

As shown in Figure 14, students indicated a moderate level of agreement with statements regarding the effect of FAM on their interest in pursuing science related jobs or careers. Considering the short duration of the activities, this is not a surprising finding.

Students in formal classrooms responded to two items related to their level of engagement in the *Find*



Meteorite activities. Figure 18 shows the results for these items. Responses were on a four-point scale (4 = really agree, 3 = agree, 2 = disagree, 1 = really disagree). Students indicated a high level of agreement with the statements, “I had fun solving science problems while doing the *Find a Meteorite* activities,” and “I enjoyed learning about the science concepts in the *Find a Meteorite* activities.”

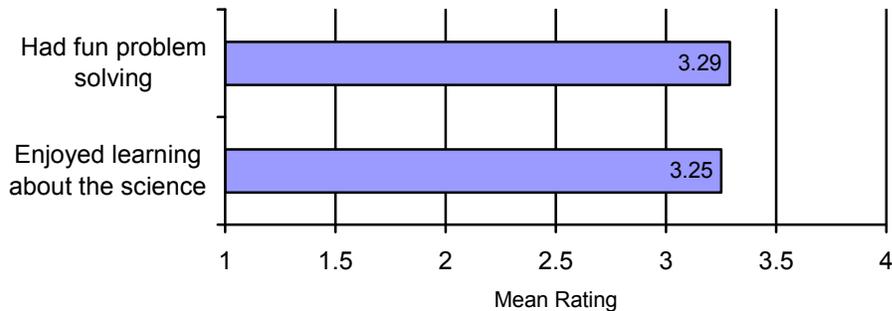


Figure 18. Mean ratings for students' level of agreement with statements regarding their engagement in FAM activities (n = 125).

Open-ended survey responses supported these findings. Students commented on what they most liked about the *Find a Meteorite* activities. They cited testing the samples to determine if they were meteorites most frequently, followed by learning the science associated with meteorites. Typical comments included, “I liked the part where we got to scratch the stone and use magnets to see what it was!” and “I liked how we got to test out the Internet site and also I liked how we did a test to find if the samples were a meteorite.” Another student commented,

The thing I like most about the find a meteorite tool was finding out about what characteristics a meteorite has so I know when I find a black rock I can find out if it is a meteorite or not.

With respect to learning about meteorites, asteroids and space, typical comments included the following:

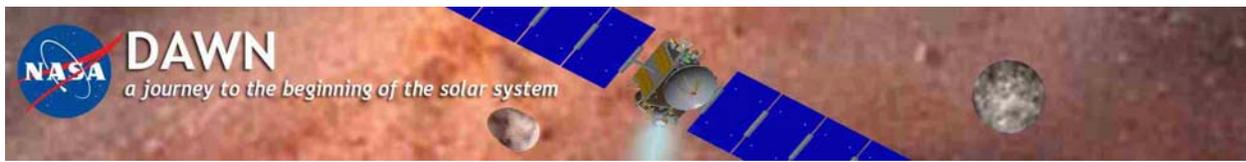
I liked how you can learn and see things that really came from space. I thought it was so interesting how meteorites are formed and how they are sent to different planets.

The thing that I liked most about the Find a Meteorite tool is that it made me more aware of the Dawn mission, and that it taught me more about what a meteorite and what an asteroid was. This also taught me new things about meteorites and asteroids.

I liked that I was able to learn more about a meteorite, while still having fun. Also, it didn't take a very long time, yet it was very productive.

Other comments about what students most liked included references to the “cool” and “fun” nature of the activities and the ease of use of the Web site. One student commented, “I liked the fact that everything is easy to find.”

Students also responded to an item on each survey asking them what would make the *Find a Meteorite* activities more fun and interesting. Student engagement and interest in the hands-on activities were reflected in their responses to this question as well. Students indicated that they would like to see more hands-on activities and experiments most frequently. Typical comments included, “I would like more experiments where we get to touch the rocks” and “I think that there should be more activities like the experiments.”



Other comments about making the activities better included such things as adding more content related to planets and meteorites and more “fun facts” about space. One student commented, “I think that the meteorite tool is cool but it does not tell you enough about what the meteorites and asteroids are.” Several students also commented that they would like to see more pictures or videos related to the content. For example, one suggested adding a movie of a meteor shower.

Increasing Student Knowledge and Skills

Students participating in the pilot testing in formal classrooms responded to a series of Likert-scale items (4 = really agree, 3 = agree, 2 = disagree, 1 = really disagree) about their learning as a result of the *Find a Meteorite* activities. Students indicated their level of agreement with four statements beginning with “As a result of this FAM tool, I learned much about...” Figure 19 presents the results for these items.

The Find a Meteorite activity increased student learning about meteorites in formal and informal settings.

As a result of this module, I learned much about:

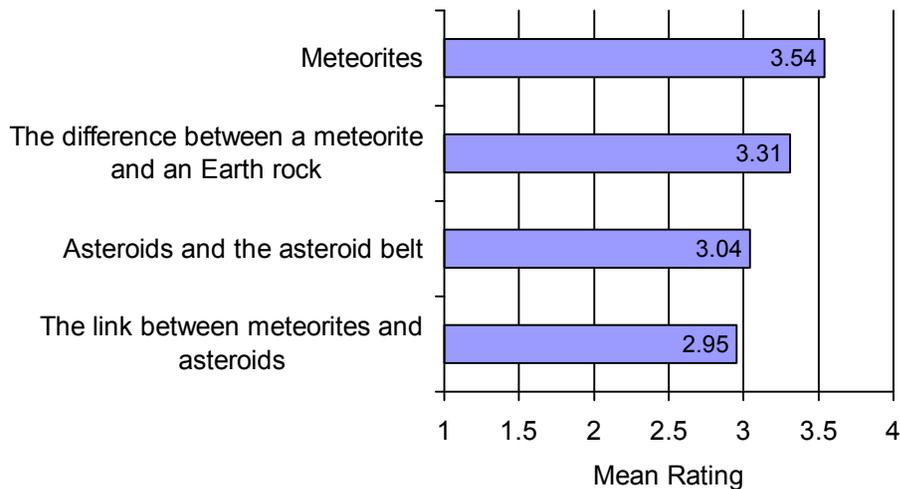


Figure 19. Mean ratings for students’ level of agreement with statements regarding their learning (n = 125).

As shown in the figure, students indicated on average that they had learned most about meteorites and the difference between a meteorite and an Earth rock. Students also agreed that they learned much about asteroids and the asteroid belt.

Students using the materials in the informal education setting indicated their level of agreement (5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, and 1 = strongly disagree) with three statements related to increased knowledge and understanding as a result of participating in the *Find a Meteorite* activities. Figure 20 presents the results for these items.

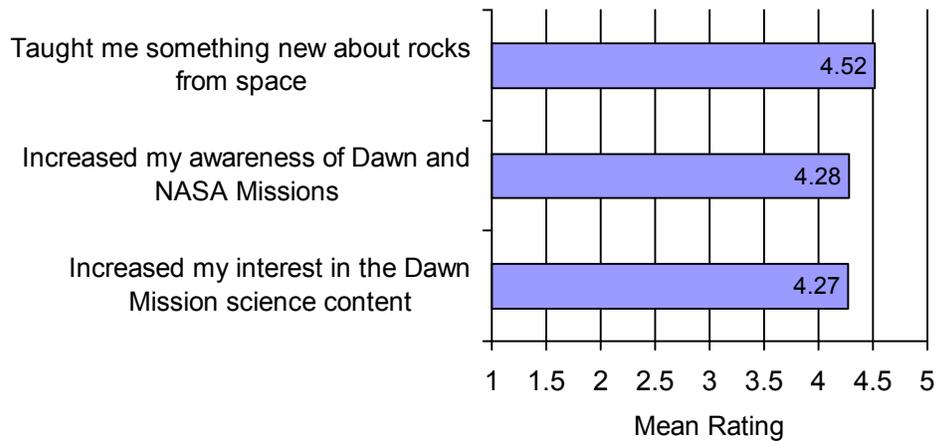
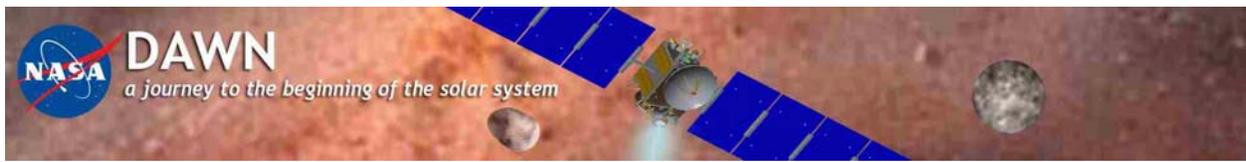
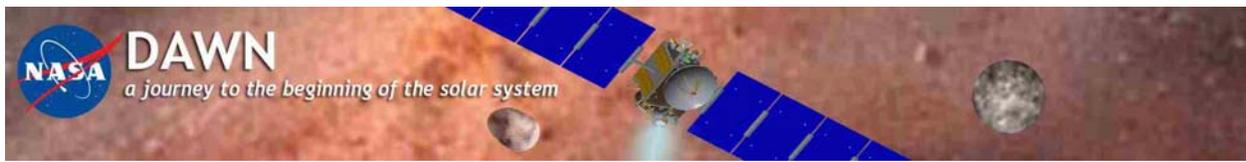


Figure 20. Mean ratings for students' level of agreement with statements regarding their understanding related to FAM activities (n = 175).

As shown in the figure, students on average had a high level of agreement that the *Find a Meteorite* activities helped them to learn something new about rocks from space. The materials were also effective in increasing student interest and awareness of Dawn Mission content. One student commented, "I liked the pictures that showed what the Dawn Mission was all about and what the space craft looked like."

Based on observations and informal assessment, 80 percent of educators agreed that the activity improved student learning about science concepts. On a scale of 1 to 7, 1 being "no learning" and 7 being "a great deal of learning," educators overall indicated that students demonstrated a moderate level of learning ($\chi = 5.60$). A formal educator offered the following written comment, "Had a great time. I truly thought the Web based activities were awesome! Students understood them and found them interesting as well."



In addition to space science content, students responded to questions asking their level of agreement on a five-point scale with statements regarding the impact of the *Find a Meteorite* activities on their understanding of the connection of science to real life and the processes of scientific investigation and problem solving. Figure 21 presents these findings.

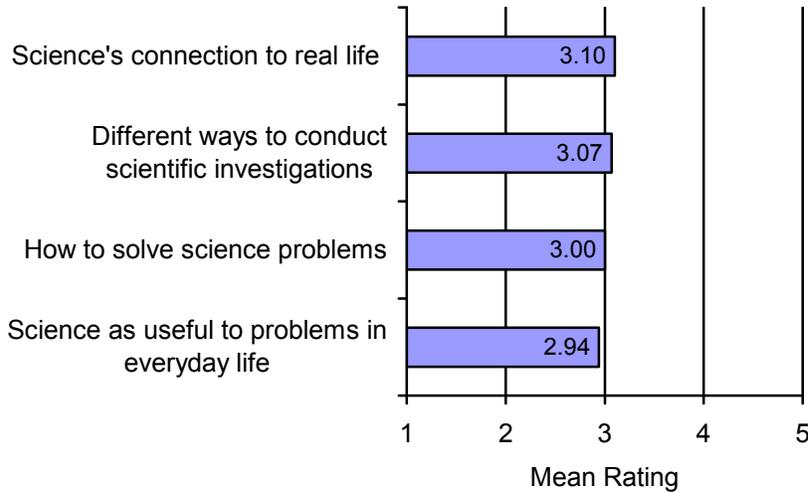


Figure 21. Mean ratings for students' level of agreement with statements regarding their understanding of science (n = 125).

Students agreed that *Find a Meteorite* helped them to understand how science is used in everyday life and how it is applicable to problem solving. They also agreed that the activities helped them to learn more about scientific investigation. As previously noted, students especially appreciated being able to conduct scientific investigations and experiments that mimicked what a scientist might do. One student commented, "I liked how you got to do research and you wrote down the answers and the stuff you could learn."

Overall, student survey responses indicate a high level of engagement in the *Find a Meteorite* activities. Students were particularly engaged in the activities that allowed them to investigate meteorites and learn more about them. Educators also reported observing a high level of student engagement in the activity. Students who used the materials in informal settings rated the *Find a Meteorite* tool very highly with 90 percent of students rating the *Find a Meteorite* tool as good or excellent (see Figure 22).

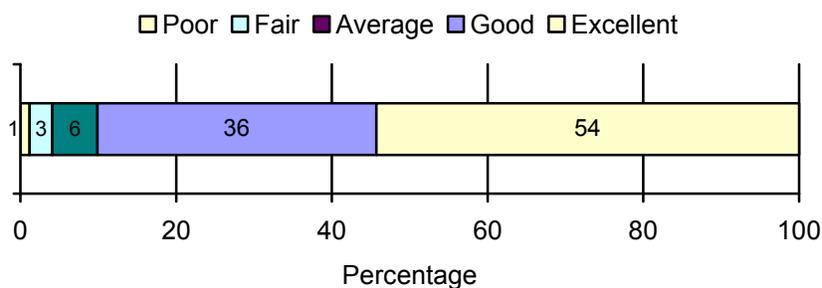
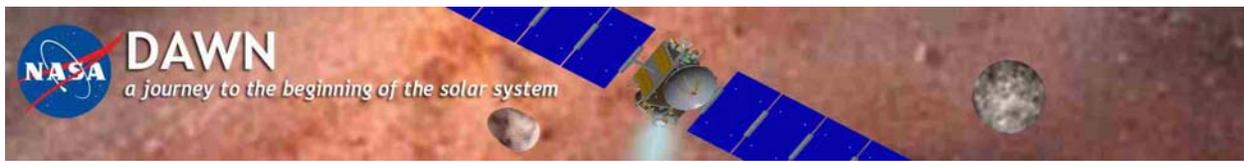


Figure 22. Percentage of students who rated the *FAM* tool as good or excellent (n = 175).



REACHING AND IMPACTING FORMAL AND INFORMAL EDUCATORS

E/PO team members aim to improve formal and informal educators' access to standards-based materials as well as to deepen their understanding of how to facilitate inquiry-based practices in science instruction. Through the Dawn outreach efforts, educators can access standards-based curriculum modules and activities, information on the science and the mission, and professional development. Team members reach their educator audience primarily through the Web site, professional conferences, workshops, and the education development networks. During this reporting period, evaluators focused on collecting feedback data from educators in formal and informal settings who volunteered to implement the *Find a Meteorite* activity with students. This report also presents feedback from participants across six professional development workshops that occurred during the study period.

Ultimate Outcome

5. Educators have a better understanding of how to implement inquiry processes leading to improved practices.

Key Evaluation Question

6. To what extent has the E/PO effort enhanced participating educators' capacity to teach space science?

Accessing Dawn Materials and Resources

Educators seeking standards- and inquiry-based space science materials and resources can access and participate in the Dawn E/PO outreach efforts in several ways. Educators can become a NASA field associate by engaging in a long-term relationship with Dawn E/PO that involves pilot- and field-testing curriculum materials, providing evaluation feedback, and disseminating E/PO materials and resources to other educators. As E/PO products become available, educators also can access the materials without becoming a field associate. Educators also access and participate in the E/PO initiative by attending Dawn workshops and trainings where they can learn about the variety of Dawn resources and materials and provide feedback by completing the workshop feedback form. Additionally, educators can access educational materials and resources through the Dawn Web site and can provide feedback voluntarily on the content and utility of the Web site by completing the online Web site evaluation form.

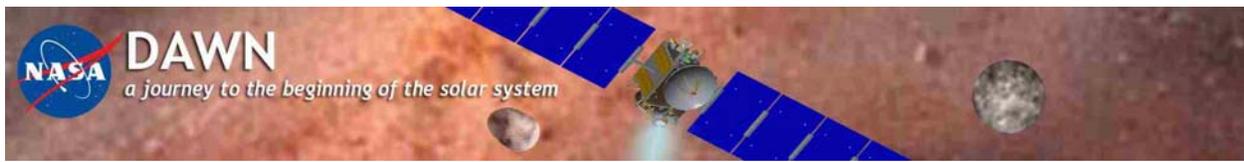
Characteristics of Educator Participants

As previously noted, during this reporting period, outreach efforts reached educators in formal and informal education settings through pilot- and field-testing as well as through professional development workshops (Figure 23). The six educators⁹ who implemented *Find a Meteorite* represent different settings including Boys and Girls Clubs, the Girl Scouts of the USA, summer school programs, the Denver Museum of Nature and Science, the Carnegie Science Center, the Little Thompson Observatory, two middle school classrooms (TX and AZ), and a community college course. The age of students with whom educators worked ranged from 8 to 19 years. Participants represented urban, suburban, and rural education settings.



Figure 23. Educators review Dawn education materials during a workshop.

⁹ Only five educators provided evaluation feedback on the activity. The sixth educator submitted student surveys but did not respond to the educator online survey or interview request.



Reaching Formal Educators in Pilot Sites

Both of the middle school classroom teachers who pilot-tested the *Find a Meteorite* tool with their students reported using inquiry-based instructional practices on a regular basis. As such, the *Find a Meteorite* tool further promoted their use of these practices with students. Both teachers agreed that using the tool increased their interest in science and improved their understanding of how to tie science learning to real-life contexts. Both teachers indicated they would recommend their materials to a colleague.

Reaching Workshop Participants

During the project period, E/PO team members represented the Dawn Mission at several educator events to over 379 participants and collected feedback from workshop participants during six workshops or presentations (Figure 24). Staff presented Dawn educator workshops at the National Afterschool Association Conference (Fort Lauderdale, FL), the Lunar and Planetary Institute Conference (Houston, TX), the National Science Teachers Association Annual Conference (Boston, MA), the Western Regional Conference (Denver CO) and the Conference for the Advancement of Science Teaching (CAST) in Austin



Figure 24. A Dawn E/PO team member facilitates an educator workshop.

TX, and the Kansas Association of Teachers of Science. These workshops focused on E/PO content modules and resources to promote further Dawn Mission education outreach. Presenters collected feedback from participants on the quality of workshop materials and activities, applicability of the sessions to classroom practice, and on the impact of the workshops on educator understanding of the topic presented. Fifty-six participants provided feedback on sessions.

Figure 25 presents participant ratings of session activities and materials. As shown in the figure, participants rated all aspects of the workshops and presentations highly. Participants rated presentations as *good to excellent* 99 percent of the time. Materials were rated *good to excellent* 95 percent of the time, and activities were rated *good to excellent* 93 percent of the time.

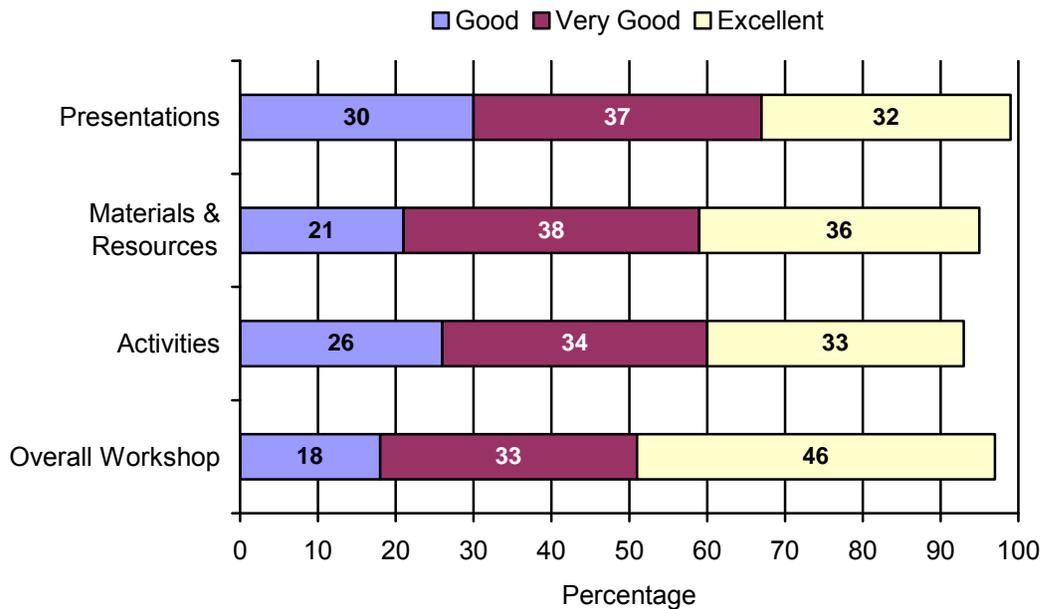
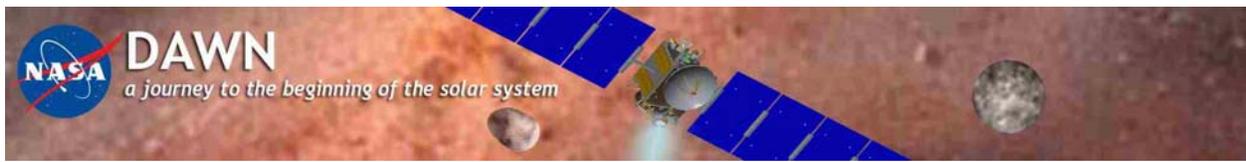
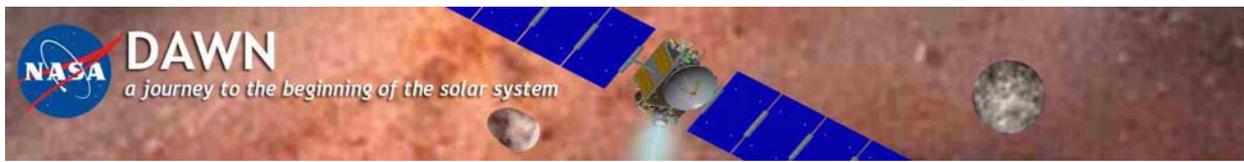


Figure 25. Participant ratings of aspects of workshop quality (n = 56).

At four of the events, participants rated the degree to which the sessions increased their knowledge of the topic and were applicable to their work as educators on a five-point scale (5 = to a great extent, 4 = to considerable extent, 3 = to some extent, 2 = to limited extent, 1 = to very limited extent). Of participants, 94 percent indicated that the sessions enhanced their understanding of the topic *to a considerable extent* or *to a great extent*. The majority (80 percent) indicated that they expected to use what they had learned in their work *to a considerable extent* or *to a great extent*. These results indicate that educators found the sessions to be both educational and valuable. In addition, the majority of participants (77 percent) indicated that they intended to share what they had learned with their colleagues.

Participant comments concerning the sessions were positive. Many commented on the excellent content and presentation of the sessions. Others commented on the relevance to classroom learning by “allowing teachers to illustrate the application of science.” One participant indicated, “I was completely unaware of Dawn and objectives—it’s different now.”



SUMMARY

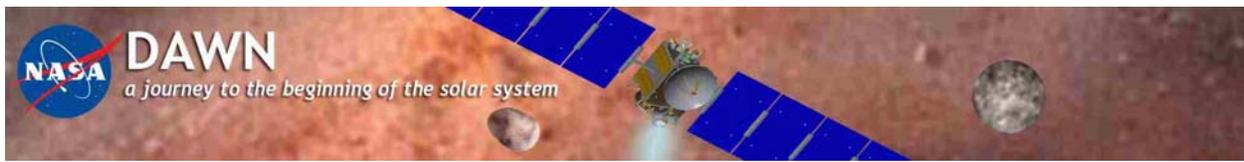
During the project period for this evaluation report, July 2007 through July 2008, E/PO efforts focused on increasing Dawn visibility around launch, enhancing the Web site and its content, further refining existing educational materials and developing new ones, promoting educator awareness of and interest in the Dawn Mission education materials, and reaching audiences through conferences and public events.

During the study period, the Dawn Mission Web site received 3,334,494 hits and 934,864 page views. People accessing the Dawn Web site visited the Dawn Homepage and Mission related sections of the Web site most frequently. Almost all visitor sessions originated from the United States, although the site had a very small number of international visitors. The majority of visitors agreed that the Web site is well organized, provides accurate information, is easy to navigate, and is a useful resource. Visitors find the Dawn Web site to be of high quality and utility with 81 percent of respondents rating the Web site as good or excellent.

E/PO pilot- and field-test efforts for the *Find a Meteorite* tool reached 300 students across formal and informal settings. Student results from the evaluation of the *Find a Meteorite* tool indicate that students learned a great deal about meteorites and experienced an increased interest in science. Students in middle school classrooms agreed that the *Find a Meteorite* activities increased their understanding of the connection of science to real life and the processes of scientific investigation and problem solving. Students in both formal and informal education settings reported an increase awareness of and interest in the Dawn mission. Both educator observations and student feedback suggest that students, overall, were engaged and interested in the materials.

Classroom Educators who used the *Find a Meteorite* tool with students implemented it with ease despite the challenge of classroom teachers in obtaining meteorite samples. This barrier does not exist when FAM is used in informal settings where meteorites are not required. Educators indicated the *Find a Meteorite* activities were appropriate for a wide range of ages and a variety of education settings, including formal classrooms, science centers, and summer school and afterschool programs. Educators resoundingly found the *Find a Meteorite* tool to be of high quality and utility. Overall, they believed students exhibited great interest in the activities and a moderate amount of learning of the science concepts. Classroom teachers reported that *FAM* increased their interest in science and improved their understanding of how to tie science learning to real-life contexts. Workshop participants indicated they learned a considerable amount about the science content and pedagogy associated with the Dawn outreach materials and would be able to apply their learning to their educational settings.

Through the dissemination of high quality and utility information, resources, and materials, the E/PO team is effectively meeting its goals of increasing target audiences' understanding of and interest in solar-system science, enhancing educators' capacities to implement scientific inquiry processes, and increasing student learning of solar-system science within a real-life context.



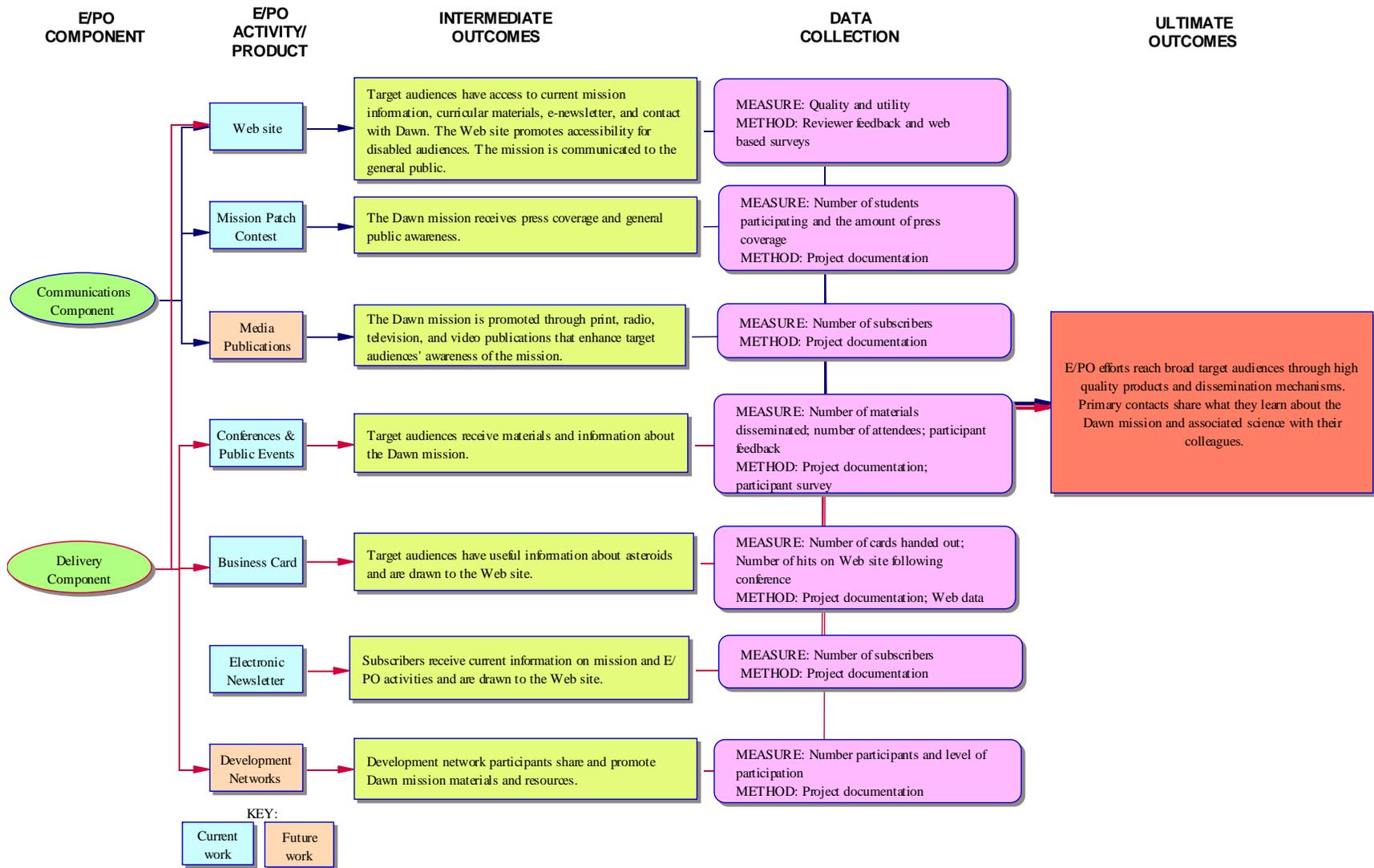
RECOMMENDATIONS

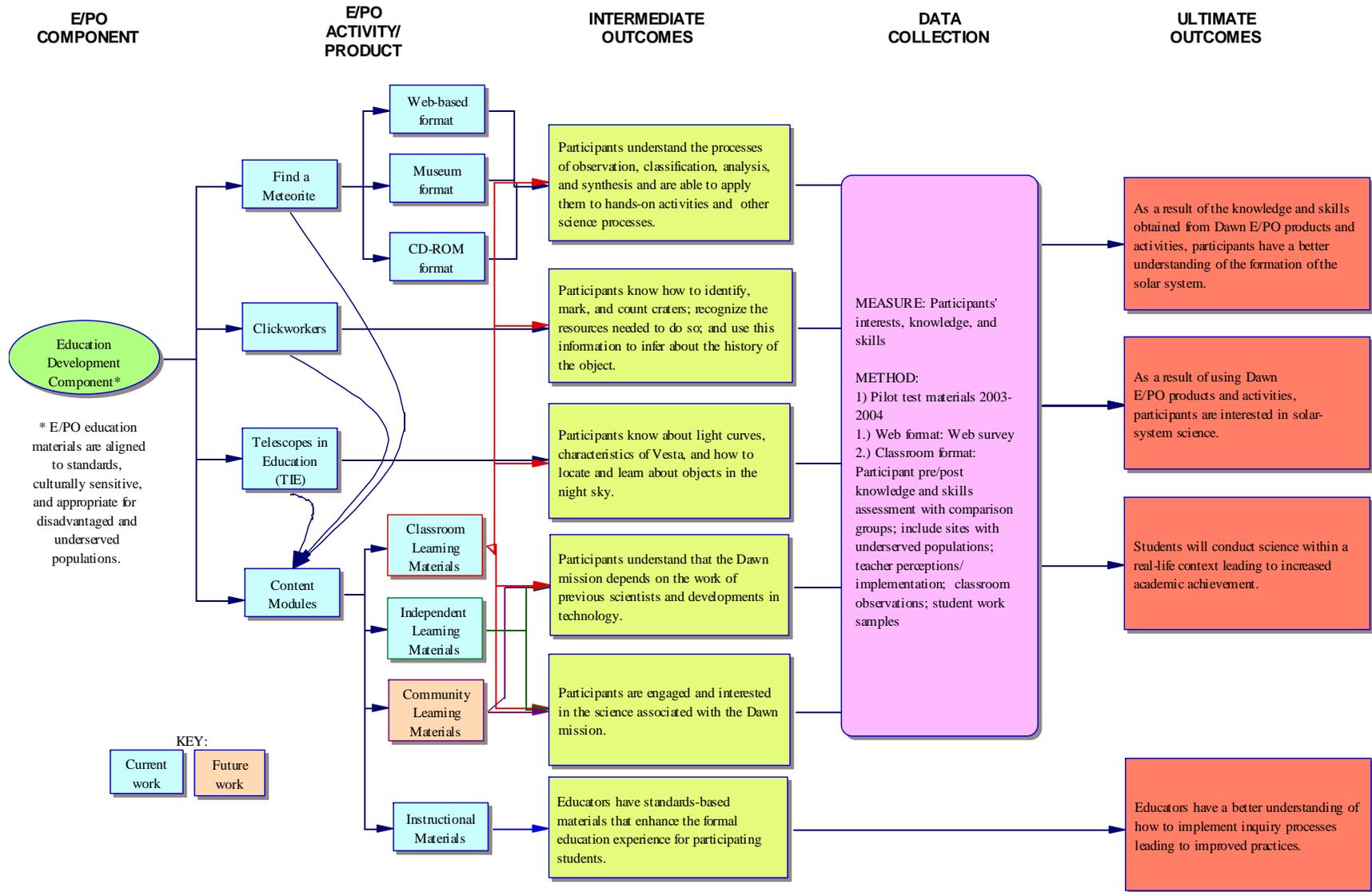
Based on the evaluation findings from the reporting period of July 2007 to July 2008, the following recommendations are provided for consideration by the Dawn E/PO team. These suggestions are intended to facilitate continued project success in project implementation and assure accountability with regard to project outcomes.

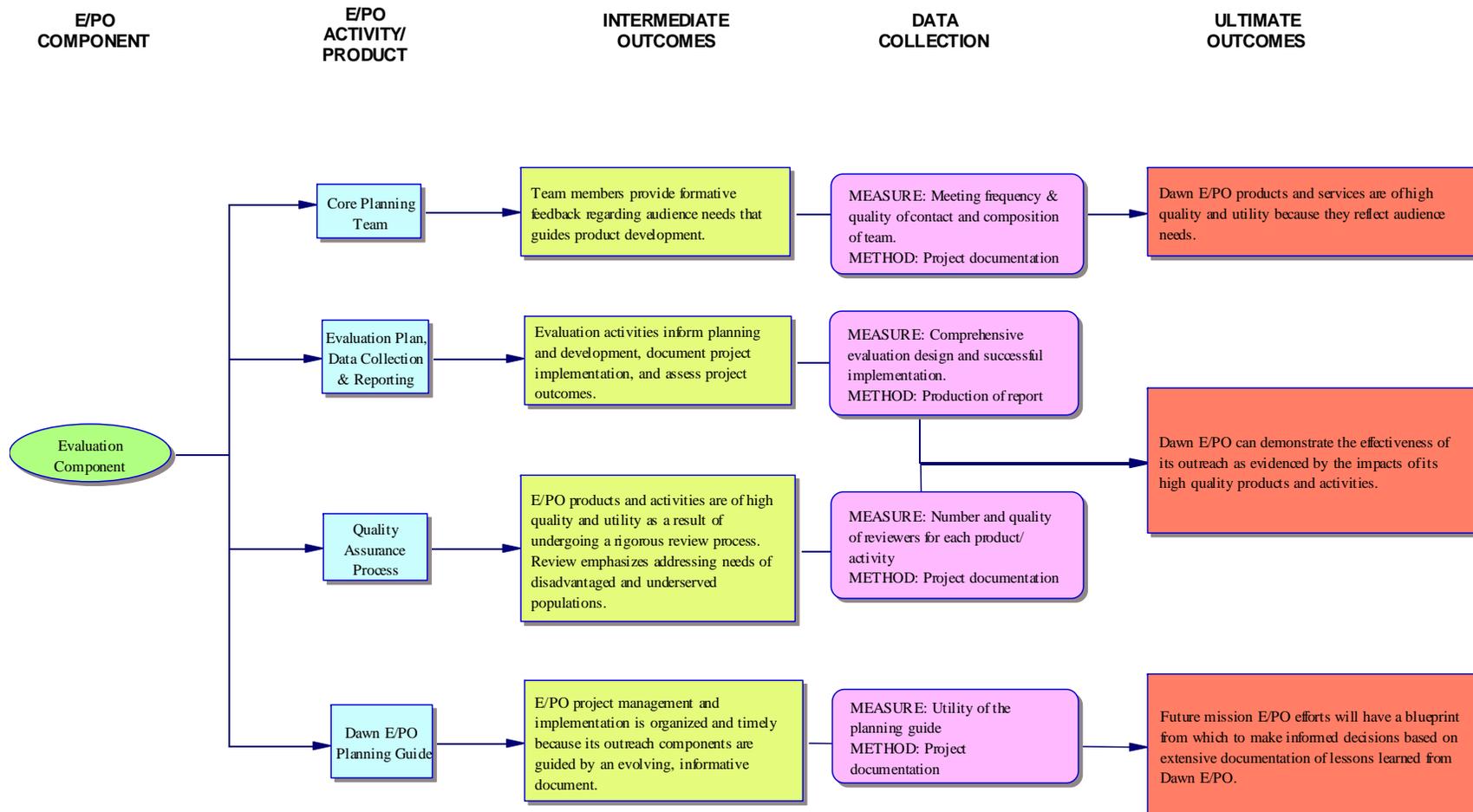
- With consideration of student feedback for how to improve the *FAM* activity, it is recommended that E/PO team members continue to explore ways to promote further hands-on activities and experiments for students. Additionally, learning materials could give greater emphasis to career awareness and opportunities in space science. Consider adding images/video resources to the *FAM* tool on the Web site.
- The *FAM* materials were pilot and field tested with a wide-range of students from the fourth grade to community college. Educators implementing the activity represented formal settings, libraries, after school programs, and science centers—all for different durations and with different levels of resources. That said, E/PO team members should provide some direct guidance for how the *FAM* activity can be used and modified for a variety of settings, available resources, time, and age groups.
- Given that Dawn E/PO educational activities increase student awareness and interest in science, it is recommended that E/PO continue to broaden participation to underrepresented groups along the K–12 continuum. One way to do this may be through partnerships with minority institutions. The E/PO team might also consider developing a diversity plan that articulates dissemination strategies for reaching underrepresented populations.
- In order to enhance the science pipeline and engage younger students in space science learning, it is recommended that E/PO team members consider developing new or modifying existing curriculum materials for elementary students in formal and informal settings.
- Given the proven capacity of the Dawn Web site to reach general public members, educators, and students, it is recommended that E/PO team members identify ways to enhance the navigation of the site's most popular content to improve ease of access. Team members might also consider increasing the number of simulations and interviews on the Web site, given their ability to engage visitors in learning more about the mission and its science content.
- Given that the evaluation of the Dawn E/PO Education Development component has focused on providing formative feedback to guide improvements, it is recommended that the E/PO team and evaluator plan for its future summative evaluation needs. The E/PO team and project evaluator should collaborate on a summative evaluation design and review current data collection instruments to more closely align them with current information needs and priorities. They should also develop a more formalized site recruitment plan for future pilot and field testing to ensure a sufficient and representative sample for the evaluation.

APPENDIX A

Logic Models for Dawn Education and Public Outreach







APPENDIX B

Evaluation Matrix

EVALUATION QUESTIONS	DATA SOURCES	DATA METHODS
Ultimate Outcomes #1 & #6: E/PO efforts reach broad target audiences through high quality products and dissemination mechanisms. Dawn E/PO products and services are of high quality and utility because they reflect audience needs.		
Objective 1: To increase the availability of E/PO products and services related to the Dawn Mission.		
1. Do users of the Dawn E/PO materials and resources perceive them to be of high quality and utility? 2. To what extent do teachers and students access and use the Dawn E/PO materials and resources? 3. To what extent do public members access and use the Dawn E/PO materials?	Internal and external reviewers Web site users Workshop participants Teachers Students Public members	Quality assurance process Online surveys Participant feedback Web statistics Dissemination data
Student Ultimate Outcomes #2, #3 & #4: As a result of the knowledge and skills obtained from Dawn E/PO products and activities, participants have a better understanding of the formation of the solar system. As a result of using Dawn E/PO products and activities, participants are interested in solar-system science. Students will conduct science within a real-life context leading to increased academic achievement.		
Objective 2: To increase student awareness, interest, and understanding of space science.		
4. a. Are participating students engaged and interested in the Dawn mission science as a result of using E/PO materials? b. Do participating students have an awareness of and interest in space-related careers as a result of the Dawn E/PO materials? 5. a. Do participating students have an increased understanding of the formation of the solar system? b. Do participating students using Dawn E/PO materials perform better than non-participants?	Students in pilot- and field-test sites Students who access online resources	Pre/post student performance data with non-equivalent comparison groups Student survey (print/online) Teacher reports
Educator Ultimate Outcomes #1 & #5: Educators have a better understanding of how to implement inquiry processes leading to improved practices. Primary contacts share what they learn about the Dawn Mission and associated science with their colleagues.		
Objective 3: To increase teachers' use of hands-on, inquiry-based educational materials related to the Dawn Mission.		
6. To what extent has the Dawn E/PO effort enhanced participating teachers' capacity to teach space science?	Teachers in development networks Participants in workshops Teachers accessing Web site resources	Pre/post assessment of capacity Participant evaluations Web-based surveys
Public Ultimate Outcomes #2 & #3: As a result of the knowledge and skills obtained from Dawn E/PO products and activities, participants have a better understanding of the formation of the solar system. As a result of using Dawn E/PO products and activities, participants are interested in solar-system science.		
Objective 4: To increase public interest in and understanding of the Dawn Mission.		
7. To what extent has the Dawn E/PO effort affected public interest in and understanding of the Dawn Mission?	Public members accessing Web site or museum resources	Web-based surveys

APPENDIX C:

E/PO Team Members' Response to Report Recommendations

DAWN E/PO TEAM RESPONSE TO RECOMMENDATIONS

Response #1:

The Dawn E/PO team acknowledges that the link between the meteorites and Dawn's mission to the asteroid belt needs to be strengthened. We are investigating the possibility of our University of New Mexico colleagues providing video and/or podcast material to improve the existing Find a Meteorite (FAM) activity. In addition, the E/PO team has several interactive components planned for our Content Module #3, (Dawn Instrumentation). Our plan here is for people to start identifying some of the boundary conditions that are informative in the formation of an asteroid and ultimately our solar system. We will look into strengthening the career component in each of these activities by exploring possible logical links to the Career Connection activity, especially the Dawn profile student handout in conjunction with specific related interviews.

Response #2:

We are pleased that the FAM materials were found useful in a variety of settings and purposes. We would like to work with the evaluator to pull this type of information from the survey responses and then to craft a "FAM Users Guide" that can provide the guidance for educators to get the most out of this tool for their unique purposes.

Response #3:

This is a good point and we have been lax in implementing our existing plan (e.g. the University of New Mexico's relationship with the Southwestern Indian Polytechnic Institute, (SIPI). We will review our plan, update it, and follow through with this recommendation by strengthening existing relationships and partnerships and looking to establish additional opportunities for dissemination of our materials. We would point out that we have recently made inroads with the Denver Public Schools as a host site for the Mars Flyby conference.

Response #4:

We hear and agree in principle with this recommendation. We have improved our kids section by making more interactive puzzles and including the board game. We are working on an interactive for people to build their own asteroid that is geared for younger audiences in informal settings. We will revisit the informal leader guides, posting them with appropriate instructions for lower grade level use. We will review this recommendation at our next Dawn Guide meeting with a view toward additional repurposing our materials to meet educational standards for the lower grades.

Response #5:

The E/PO team agrees completely with this recommendation and will continue to improve this component of our E/PO strategy. We have begun this work by redesigning the mission index page (<http://dawn.jpl.nasa.gov/mission/index.asp>) and are reviewing all pages based on user feedback.

Response #6:

We agree with this recommendation and are formulating a plan to carry out the summative evaluation from 2009 through 2015. The details of the plan will be included in the revision of the Dawn E/PO Planning Guide.