

Elementary and Secondary Education Program Plan

1.0 PROGRAM OVERVIEW

This document is the Elementary and Secondary Education program plan for the Office of Education. It serves as a controlling document that defines the top-level strategy and the management structure for the Elementary and Secondary Education program, and is intended to be a living document that will be updated and reviewed as additional information is developed, or at least annually.

1.1 Introduction

For nearly 50 years, NASA's journeys into air and space have deepened humankind's understanding of the universe, advanced technology breakthroughs, enhanced air travel safety and security, and expanded the frontiers of scientific research. These accomplishments share a common genesis: education. NASA will continue the Agency's tradition of investing in the Nation's education programs and supporting the country's educators who play a key role in preparing, inspiring, exciting, encouraging, and nurturing the young minds of today who will manage and lead the Nation's laboratories and research centers of tomorrow.

NASA's Elementary and Secondary Education program is designed to provide students and educators with tools, experiences, and opportunities to further their education and participation in unique NASA learning experiences that enhance their knowledge of science, technology, engineering and mathematics (STEM). The individual efforts emphasize family involvement, which has been shown to enhance student achievement. The program also supports the role of educational institutions, which provide the framework to unite students, families, and educators for educational improvement. This program integrates new components with existing NASA assets into a structure that supports local education efforts to encourage student involvement in STEM.

NASA is taking bold steps at the K-12 grade levels to prepare the next generation of explorers. Building on previous accomplishments, NASA has established a series of innovation projects and activities designed to stimulate student interest and motivation to pursue higher levels of study in science, technology, engineering, and mathematics (STEM).

The projects and activities provide opportunities in unique NASA learning experiences for students, teachers, administrators, and families. NASA strives to ensure that underrepresented and underserved students participate in education programs to encourage more of these students to pursue STEM careers. NASA is also working to develop new digital media methods of making its exciting discoveries and missions available to K-12 students and educators.

NASA education efforts are designed to: improve the understanding and appreciation of science, technology, engineering, and mathematics disciplines, to enhance scientific and technological literacy, mathematical competence, problem-solving skills, and desire to learn; provide educators with unique teaching tools, compelling teaching experiences, and world-class research experiences; inspire students through hands-on activities to pursue careers in science, mathematics, engineering, and technology; and, build a diverse pipeline of science and engineering talent to serve in the coming decades and continue America's pre-eminence in space and aeronautics research and development.

NASA already has a number of innovative projects that use science, technology, engineering, and mathematics resources (content, people, and facilities) to inspire the next generation of explorers and innovators through the Vision for Space Exploration. Among the current elementary and secondary education projects are:

Aerospace Education Services,
Educator Astronaut,
Education Flight Projects,
Interdisciplinary National Science Program Incorporating Research and Education
Experience,
NASA Explorer Schools, and
Science Engineering Mathematics and Aerospace Academy (SEMAA)

Within the education portfolio there is a delicate balance within the pipeline of opportunities for NASA to inspire, engage, educate, and employ our Nation's talented youth. The primary goal remains attracting and maintaining a workforce that is representative of the Nation's diversity and includes competencies that NASA needs to deliver and sustain levels of high performance that the Agency's challenging mission requires. As we move towards the Vision we must continually assess the strategy for deploying our resources, be that for attracting students to the teaching profession; providing pre-and in-service teacher training; providing leading-edge research opportunities for faculty and students that compliment NASA's research; developing curricula that infuses innovative learning experiences into the curriculum; or, supporting informal learning across government, industries and professional organizations.

1.1.1 Elementary & Secondary Projects

At this time, the Office of Education has six core projects being funded under its Elementary and Secondary Education Program. Description on each project is provided. This list will be updated as Mission Directorates and Centers complete project plans.

Aerospace Education Services Program (AESP). Professional development program that serves the elementary and secondary education community by providing classroom demonstrations, faculty workshops, parent training, in-service training for teachers, and identification of appropriate classroom resources. NASA uses former teachers who are well-trained and well-equipped in STEM content and are knowledgeable of national standards and research-based pedagogies. AESP provides important ongoing support to the NASA Explorer Schools with customized professional development to meet the needs of each participating school.

Educator Astronaut Program (EAP). NASA's Educator Astronaut project has helped to infuse into education new content, advanced technological tools, and other educational services such as direct participation in space research and interaction with NASA scientists, engineers, and astronauts. To date, the project has trained the top tier of Educator Astronaut applicants, called the Network of Educator Astronaut Teachers (180), to perform as NASA Education advocates by engaging their schools and communities across the country in NASA education activities and informing them of NASA resources.

Education Flight Projects (EFPO). Provides opportunities for K-12 students to gain hands-on experience as payload investigators using NASA flight platforms such as the Space Shuttle, the International Space Station, sounding rockets, and scientific balloons. EarthKAM, the Amateur Radio on ISS, and the ISS Education Downlinks are three activities under Flight Projects that have enabled the platform of ISS to have an international reach to educational

communities and to inform the public of the excitement and value of space research.

- **Interdisciplinary National Science Program Incorporating Research and Education Experience (INSPIRE).** Intended to become a multi-tiered pipeline program designed to bridge students' STEM education experiences for pre-college and post-secondary students. INSPIRE provides critical STEM pathways for eligible

U.S. citizens, with special emphasis on underrepresented and underserved groups. Students are exposed to STEM experiences and encouraged to consider graduate studies in STEM fields. Additionally, INSPIRE provides a public benefit by incorporating parent and community participation through program activities that inform and engage the public in the Vision for Space Exploration.

NASA Explorer Schools (NES). Project establishes a three-year partnership between NASA and school teams, consisting of teachers and education administrators from diverse communities across the country. Focusing on underserved populations, NES joins educators, students, and families in sustained involvement with NASA's research, discoveries, and missions. The project is designed for education communities at the 4-9 grade levels to help middle schools improve teaching and learning in science, technology, engineering, and math through significant structural techniques such as professional development, stipends, grants and curricular supports based on NASA's resources. An integral part of the NES is availability of the NASA Digital Learning Network (DLN) that provides NASA people, technology, facilities, programs, and resources to deliver learning opportunities via videoconferences to teachers and students.

Science Engineering Mathematics and Aerospace Academy (SEMAA). National program designed specifically to reach K-12 minority students that are traditionally underrepresented in careers involving science, technology, engineering, and mathematics (STEM). Students meet during school, after school or on Saturday mornings and during the summer to engage in hands-on, interactive learning sessions that are specifically designed for each grade level. Engages students, teachers and

parents by incorporating emerging technologies into the program and provide a challenging curriculum that meets national math, science and technology standards.

Proactively addresses these goals by delivering a hands-on/minds-on curriculum, a state-of-the-art Aerospace Education Laboratory and an innovative Family Café

1.1.2 National Context

The February 2006 study from Domestic Policy Council of Office of Science and Technology Policy, "*America's Competitiveness Initiative*," is expected to have reaching impact towards future legislation and Federal Agencies involved in STEM. Recommendation from this study on Elementary and Secondary Education targets the following:

Strengthens K-12 math and science education by enhancing our understanding of how students learn and applying that knowledge to train highly qualified teachers, develop effective curricular materials, and improve student learning

Major national studies and reports are likely to become a continuous source for reflection and adjustments to NASA's Elementary and Secondary Education Program. The May 2005 report by the National Academies, "*Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*," is yet example of recent study. Specific recommendation that focused on actions in K-12 education was (*10,000 Teachers, 10 Million*

Minds) --Increase America's talent pool by vastly improving K-12 science and mathematics education.

Legislative actions, such as the 2006 NASA Authorization Bill, the Deficit Reduction Act of 2005 (establishment of the Academic Competitiveness Council) and Congressional-directed mandates, will further influence and shape existing projects and the expansion, consolidation, or cancellation of activities supported under the Elementary and Secondary Education.

Finally, expected recommendations as a result of the 2006 National Research Council's review of NASA's Pre-college Programs will serve as another near term resource for refining direction and focus of the Elementary and Secondary Programs.

1.2 Program Goals, Objectives and Metrics

Since the creation of the National Aeronautics and Space Administration, NASA has made a substantial commitment to education. As stated in the NASA 2006 Strategic Plan:

“NASA will continue the Agency's tradition of investing in the Nation's education programs and supporting the country's educators who play a key role in preparing, inspiring, exciting, encouraging, and nurturing the young minds of today who will manage and lead the Nation's laboratories and research centers of tomorrow.

Beginning in 2006, NASA will pursue three major education goals:

Strengthen NASA and the Nation's future workforce
Attract and retain students in STEM disciplines
Engage Americans in NASA's mission

NASA Education investments are expected to map to at least one of the three overarching NASA Education Outcomes as part of annual performance, to track efforts back to the identified outcome manager, and to contribute to the FY06 (and beyond) annual performance goals (APGs).

Outcome 1: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals, through a portfolio of investments.

Outcome 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.

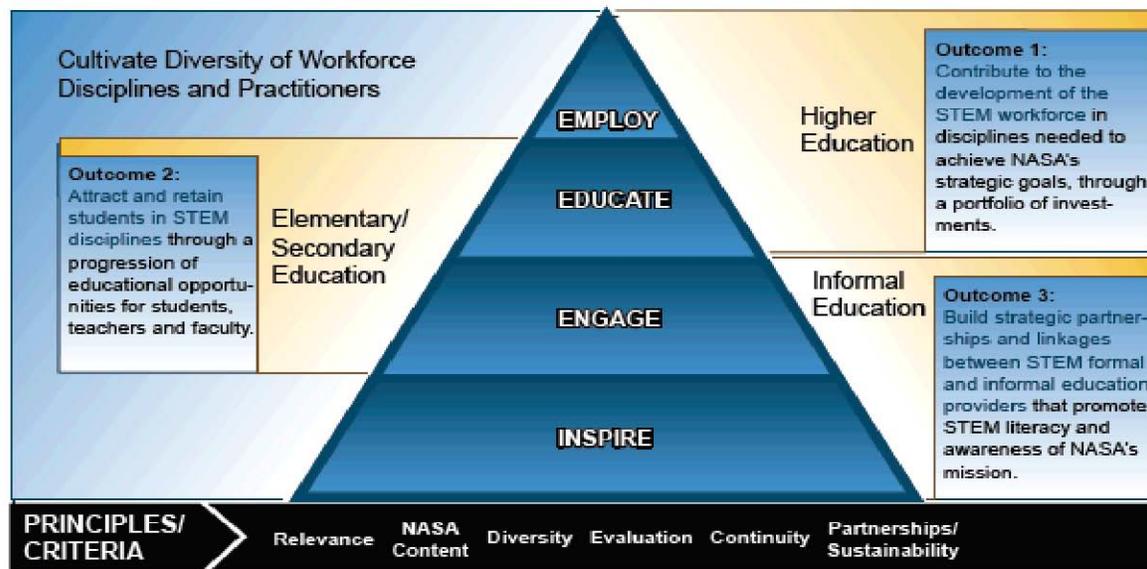
Outcome 3: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.

The Elementary and Secondary Education projects are intended to serve as major links in the student pipeline used to address the Education Goals from NASA's 2006 Strategic Plan. The Elementary and Secondary Education program focuses primarily on Outcome 2:

- Attract and retain students in STEM disciplines – To compete effectively for the minds, imaginations, and career ambitions of America's young people, NSA will focus on engaging and retaining students in STEM education programs to encourage their pursuit of educational disciplines critical to NASA's future engineering, scientific and technical

missions.

The Elementary and Secondary investments map to NASA Education **Outcome 2**, “*Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty*”, via programs that use NASA content, people or facilities. Programs are integrated in the **Engage and Educate** categories of the Education Framework. Investments to this outcome are contributed through HQ Education, Mission Directorates, Centers, and strategic partnerships.



The Education Strategic Framework (depicted above) is a strategic management tool that allows the Agency to monitor participant movement through education activities, with each category leading to the next. Education programs and projects draw from the category below them – as a key source for participants – and they connect participants to the category above them – providing a more experienced and focused group and creating a measurable pipeline.

Definitions for the four levels of involvement are articulated within the document, “NASA Education Strategic Coordination Framework: A Portfolio Approach.” Below are the descriptions for Engage and Educate, for which the Elementary and Secondary Education Program targets:

Engage — Education activities that in some manner incorporate participant interaction with NASA content for the purpose of developing a deeper understanding. Participants are strategically identified and targeted.

Educate — Focused education support that promotes learning among targeted populations. Education activities focus on student learners, or pre-and in-service educators, and are designed to develop and/or enhance specific STEM knowledge and skills using NASA resources. *Educate* activities promote new knowledge acquisition and strengthen an individual’s skills. NASA’s elementary and secondary education efforts are supplementary to formal classroom instruction.

In addition to direct contributions to Outcome 2, elementary and secondary education projects are

expected to look for synergy and continuity of efforts with other projects that are mapped to this same outcome as well as to other activities identified as “engage” and “educate”. Thus, linkage with Informal and Higher Education projects and activities is encouraged to support the appropriate progression of education opportunities for learners. Project managers are expected to demonstrate and collect evidence of where they draw from and how they move their constituents (push-pull concept). In addition, attention is to be given by Centers assigned Congressionally-directed projects that have a target at K12 to shape earmarks in order that these projects address the programmatic requirements of the Elementary and Secondary Program Plan

Furthermore, examination of the cross-cutting investments --dissemination, coordination, research and development, and evaluation --will be important elements for all Outcome 2-targeted and Elementary and Secondary projects to see that these investments are fold into efforts in support of continuity and synergism. Examples of where and how the investment by Elementary and Secondary to the cross-cutting investment of R&D might be made as mapped to support Outcome 2 objectives include:

- Applied Research

- provide evidence for the effectiveness of materials and feedback for strengthening the portfolio; and identifies possible new directions in instructional materials and assessment. (Obj 2.3)

- Professional development models that provide for the preparation of informal educators, pre-and inservice STEM teachers to work effectively with NASA-themes and content within designated learning progressions that result in effective informal and formal (classroom) instruction (Obj. 2.1 and 2.2)

- Educational Technology

- pursue R&D to enable new learning environments using simulations, visualizations, immersive environments, game-playing, and learner networking (Obj. 2.4)

- target development of modeling and visualization tools that are known to support best practices of inquiry-based learning. When modeling and visualization tools are used for authentic, ill-defined investigations, learners at both grade school and university levels can be engaged in making expert-like choices and decisions for their research. (Obj. 2.3 and 2.4)

Finally, the results from the Spring 2006 Portfolio Inventory Data Call should be used in supporting identification of projects and activities by managers to ensure synergism and continuity across levels and Outcomes.

Agency Strategic Goal

Attract and retain students in STEM disciplines.

Agency Strategic Outcome

Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty. (*Outcome ED-2*)

Elementary and Secondary Program Objectives

2.1 Educator Professional Development—Short Duration

- Objective (**Engage**) Provide short duration professional development and training opportunities to educators, equipping them with the skills and knowledge to attract and retain students in STEM disciplines.

2.2 Educator Professional Development—Long Duration

- Objective (**Educate**) Provide long-duration and/or sustained professional development training opportunities to educators that result in deeper content understanding and/or competence and confidence in teaching STEM disciplines.

2.3 Curricular Support Resources

- Objective (**Engage**)
Provide curricular support resources that use NASA themes and content to: a) enhance student skills and proficiency in STEM disciplines (**Educate**). b) inform students about STEM career opportunities (**Engage**). c) communicate information about NASA's mission activities (**Engage**).

2.4 Student Involvement K-12

Objective (**Engage**) Provide K-12 students with authentic first-hand opportunities to participate in NASA mission activities, thus inspiring interest in STEM disciplines and careers.

Objective (**Engage**) Provide opportunities for family involvement in K-12 student learning in STEM areas.

See Appendix B for the complete list of potential outputs, outcomes, and efficiency measures for the Elementary and Secondary Program Objectives.

Elementary and Secondary Education Tactical Approach

Make available NASA-unique strategies, tools, content, and resources supporting the K12 education community's efforts to increase student interest and academic achievement in science, technology, engineering, and mathematics disciplines.

Four categories of activities within the Elementary and Secondary portfolio which support the tactical approach are identified, along with specific objectives underneath each category. The categories and objectives have been approved by the Education Coordinating Committee (ECC).

Educator Professional Development – Short Duration
Educator Professional Development – Long Duration
Curricular Support Materials
Student Involvement

Cross-cutting investments that enable linkage by Elementary and Secondary with Informal and Higher Education Programs in maximizing accomplishments of Outcome Two include:

Dissemination
Coordination
Research and Development
Evaluation

Strategic Approach to Implementing Congressionally Directed Appropriations :

The policy of the Office of Education is to manage earmark projects as integral components of its education portfolio. Thus, each project must contribute to achievement of one of three defined education outcomes and must be implemented according to the objective(s) of the relevant bucket. Projects are accountable for the same performance requirements, including performance measurement reporting, as are all other projects in the education portfolio.

See more description on these categories under Section 2.1 Program Requirements.

Performance Goals and Measurement

The Elementary and Secondary Program will place an increased emphasis on strategic planning and performance measurement with each project and across the program to (a) better define the expected outcomes, (b) identify appropriate measures, baselines, and targets to document achievements, and (c) ensure that reliable, valid, and comprehensive performance data are collected, analyzed, and reported from all projects on an annual basis, with reports available to stakeholders, as appropriate.

The Program will conduct regular program reviews to (a) determine the degree to which projects are effective and relevant, (b) ensure an appropriate balance among projects, and (c) eliminate, enhance, or add projects towards accomplishing intended Program outcome. Additional efforts will be made to track participation, particularly K-12 students.

Each project is expected to identify annual performance goals and indicators in support of the strategic goal, outcomes, and objectives under the Elementary and Secondary Program.

See Section 3, Review, for requirements on projects' evaluation, review and reporting. Every NASA-sponsored E&S education project is to be developed, implemented and evaluated according to the NASA Education Strategic Framework and operating principles.

Performance Measures

Projects will be expected to address one or more of the objectives and collect data to address the measures of output, outcome, and efficiency. In addition, each project will define annual performance goals that can be mapped to the Outcome and objectives.

Appendix A contains the current Annual Performance Goals and Program Assessment Rating Tool measures (as agreed upon for FY2006 and 2007). It is assumed that further adjustment to the 2007 measures will be addressed between NASA and OMB at the same time that the 2008 measures are presented. Once confirmed, these performance measures will be communicated and the E&S Education Program Plan adjusted accordingly.

1.3 Customer and Stakeholder Definition and Advocacy

Elementary and Secondary Education projects are managed at NASA Field Centers. Center education offices work closely with their regional customer base in support of systemic reform initiatives in formal education, assist with the generation and communication of knowledge for their unique research and technology development requirements by involving colleges and universities across the country, and establish linkages with informal education networks in support of Agency national STEM education initiatives.

Key Participants:

Primarily certified teachers from the selected schools, who will be provided professional development in STEM subject areas.

Students selected through competitive application processes to increase their STEM awareness and knowledge through individual experiential opportunities.

Elementary and Secondary Education activities may involve astronauts, engineers, scientists, and mathematicians from the public and private sectors addressing NASA's related disciplines and topics.

NASA Customers

Aeronautics Research Mission Directorate (ARMD), Exploration Systems Mission Directorate (ESMD), Science Mission Directorate (SMD), and Space Operations Mission Directorate (SOMD)

Center Education Offices

Office of Strategic Communications

NASA education product developers

NASA formal and informal education program managers

Federal and External Customers and Stakeholders

Non-governmental organizations: Association for Educational Communications and Technology, International Society of the Learning Sciences, National Consortium of Instruction and Cognition, National Council of Teachers of Mathematics (NCTM), National Science Teachers Association (NSTA), Society of Women Engineers, American Institute of Aeronautics and Astronautics, Society of Hispanic Professional Engineers, Education Development Center's Center for Children & Technology, International Technology Education Association, International Society for Technology in Education, National Federation of the Blind, and others.

Academia: educators (formal/informal), faculty, and researchers in the science, technology, engineering, and mathematics (STEM) fields; educators who use NASA

education products and Web services and their students; University of Central Florida, Massachusetts Institute of Technology, University of Wisconsin, and Macquarie University; and others.

Federal Agencies: National Science Foundation/National Digital Library (ENC); Department of Education What Works Clearinghouse and Office of Educational Technology; Department of Defense (DOD) Armed Forces Radio and Television Service and Technology Consortium and DOD STEM Education and Workforce Development; the National Academies; Department of Agriculture; National Oceanic & Atmospheric Administration; and others.

Members of Congress: House Science Committee Democratic Caucus.

NASA's partners and collaborators: AOL, Cable in the Classroom, OfficeMax, American Museum of Natural History, Nickelodeon, Discovery Education, World Book, Nintendo America, Passport to Knowledge, Houghton Mifflin, Columbia TriStar Motion Picture Group, and others.

Private industry: "non-traditional" commercial areas.

To effectively strengthen the Nation's STEM workforce, NASA must implement activities that are useful to the education community and that strengthen their ability to engage students in the STEM pipeline. The E&S Program ascertains customer satisfaction by soliciting and analyzing customer feedback as reported through the NASA Education Evaluation & Information System (NEEIS); by beta, pilot, usability, and field-testing specific project elements; and independent

evaluation. Outcome reviews will employ a variety of mechanisms to assure that activities associated with Outcome 2 align with the education operating principles, yield demonstrable results, and reach intended audiences. Use of external reviewers will be an integral part of outcome reviews to provide NASA with credible information regarding how well the Elementary and Secondary Education efforts meet customer needs.

1.4 Program Authority and Management Structure

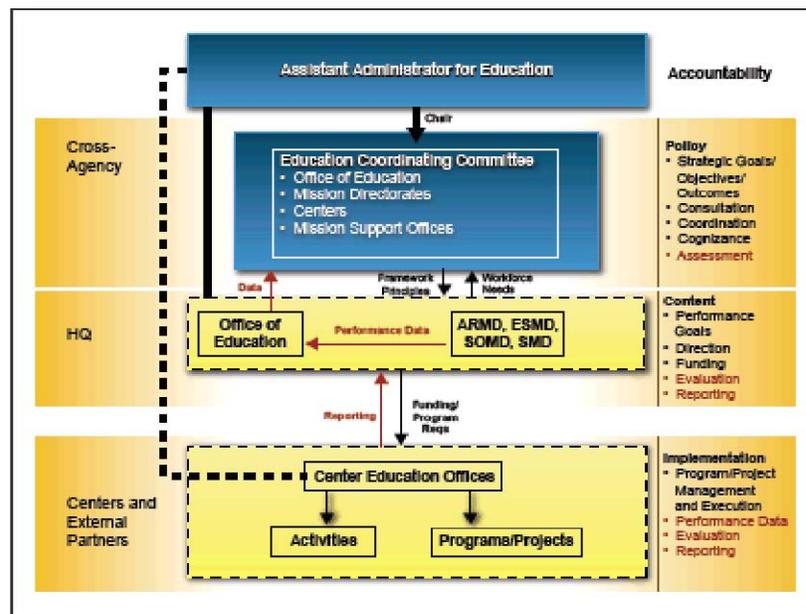


Figure 3 – Educational Portfolio Coordination Framework

Assistant Administrator (AA) for Education – responsible to the NASA Administrator for the NASA Education Portfolio, reporting directly to the Chief of Strategic Communications. The AA for Education serves a dual role for the Agency. First, the individual serves as the head of the Office of Education and manages all responsibilities assigned to the Office. Second, the AA for Education serves as the Chair of the Education Coordinating Committee (ECC), ensuring the overall planning, coordination, and integration of the Agency’s education portfolio.

Office of Education (OE) – administers national education efforts that draw on content from across the Agency. NASA's educational activities reflecting a balanced and diverse portfolio of programs: **Elementary and Secondary Education**, Higher Education, eEducation, Informal Education, and Minority University Research and Education Projects (MUREP). As an institutional management office, the OE is responsible for ensuring compliance with external requirements and laws, NASA-wide processes, procedures, standards, audits, and accounting related to Education. It also provides the leadership for coordinating and integrating NASA’s education strategic framework, implementation approach, and policies. The OE provides national partnership networks and infrastructure to disseminate NASA education content and activities developed by the Mission Directorates, Field Centers, and education partners. It solicits external advice, and represents the Agency externally, especially in interactions with Congress, the Office of Management and Budget, and other Federal agencies.

Center Education Offices – responsible for implementing NASA education programs, projects and activities for the Mission Directorates and the Office of Education, as well as planning and

implementing education programs that are unique to and funded by their Centers. Centers are responsible for execution of programs and projects and for institutional assets. The center education offices provide expertise in state standards and requirements in their area of geographic responsibility for K-12 education, and provide valuable field-based input into education program planning. Center education offices work closely with their regional customer base in support of systemic reform initiatives in formal education, assist with the generation and communication of knowledge for their unique research and technology development requirements by involving colleges and universities across the country, and establish linkages with informal education networks in support of Agency national STEM education initiatives. Center Education Offices maintain cognizance of all NASA-funded education efforts that take place in their geographic region and/or programmatic areas of responsibility regardless of funding source.

Center Education Directors – report administratively to their center management and functionally to the Office of Education, as well as receiving programmatic direction from the Headquarters organizations that provide education funding to their center. Center Education Directors are functionally responsible for all center education efforts.

Elementary and Secondary Program Manager – responsible for making and executing decisions within the manager’s authority. Accordingly, the E&S Program Manager has authority over budgets, schedules, and human and capital assets. The Manager is responsible for working across organizational lines to perform appropriate integration functions. In general, management decisions are not subject to higher governance. E&S Planning, Programming, Budgeting, and Execution (PPBE) guidance outlines specific responsibilities of the **Elementary and Secondary Project Managers** to develop Project Plans, Request for Proposals and other contract-related documents, reports associated with major reviews, and other key activities (reference Appendix B).

Education Coordinating Committee (ECC) – a collaborative structure that maximizes NASA’s ability to maintain an integrated education portfolio and strategically manage the implementation of numerous programs, projects and activities in a distributed system. To accomplish the Education Outcomes, the ECC plans and strategizes collaboratively, allowing the Assistant Administrator of Education to assess and evaluate the health of the entire education portfolio. The ECC provides an overarching Agency structure where issues are fully discussed. The ECC also provides checks and balances for effective internal control and ensures the successful achievement of education goals. In accordance with the Balance of Power described in NASA Procedural Document (NPD) 1000.0, Section 3.2.4, the Office of Education AA, with input from the ECC, maintains control of architectures, strategy and top-level requirements, while Mission Directorates and the Office of Education maintain control of schedules and budgets for their own programs. Centers execute programs and projects and have a voice on the ECC to ensure coordination, integration, and teamwork.

Responsibilities of the ECC

Develop the overarching Agency education strategic framework and policies to meet Agency needs.

Ensure an integrated portfolio and a coordinated investment strategy for education programs across NASA.

Maintain cognizance of all Agency education projects, major milestones, major evaluations/reviews, and investment plans.

Establish criteria for evaluation of education efforts and assess the results of those evaluations.

ECC Membership

To ensure a true collaboration and an integrated approach to education, the Education Coordinating Committee requires broad cross-Agency representation. Members of the ECC speak authoritatively on behalf of their organizations, and include:

- Assistant Administrator for Education (Chair)
- Deputy Assistant Administrator for Education
- Executive Secretary to the Committee
- Education Lead identified by each Mission Directorate (4)
- Center Education Office Directors (10)

Representatives from the Offices of Diversity and Equal Opportunity, Human Capital Management, Public Affairs, Legislative Affairs, External Relations, and the Astronaut Office

2.0 PROGRAM BASELINE

Beginning FY2007, HQ Education, Mission Directorates, and Centers will complete Project Plans on all efforts that target Elementary and Secondary Education and respond to Outcome 2. The Elementary and Secondary Education Program Plan will provide necessary direction and guidance to these plans to ensure consistency of efforts specific to goals, objectives, metrics, reporting, and evaluation. The Program and Project Plans will be given to the Outcome Executive and interface between the Executive, the Program and Mission Directorate Education Leads in execution of efforts will occur during fiscal year.

The realignment of HQ education projects to the Centers beginning late FY06 will necessitate adjustments to management processes and interface mechanisms throughout FY07. Outcomes from these adjustments will present opportunities for refinement to the guidance and policy as defined from HQ and with Program and Project Management as proposed from Centers.

2.1 Program requirements

NASA uses objective and verifiable performance metrics, regular management insight and review processes, and defined tools to assess its performance at all levels—portfolio, outcome, and the individual program/project/product/activity. Each level of management participates in setting performance targets, consistently evaluates performance against those targets, and reports the results through management to the ECC. If performance measures are carefully and thoughtfully chosen and applied, the regular performance evaluation at each level becomes one of our most important means of identifying problem areas and opportunities for better management, leading to greater organizational effectiveness and guiding investment strategies.

NASA's success in implementing its education portfolio is determined by the Agency's ability to meet or surpass the Outcomes outlined in Section 1.2. NASA uses objective and verifiable performance metrics, regular management insight and review processes, and defined tools to assess its performance at all levels—portfolio, outcome, and the individual program/project/product/activity. Each level of management participates in setting performance targets, consistently evaluates performance against those targets, and reports the results through management to the ECC.

Monitoring and Control is the process by which the Agency receives quantitative or qualitative data collected from the planning and implementation phases and evaluates the level of success

in executing the Agency’s education portfolio. Feedback is received through audits and assessments of programs, projects, products, and activities against the metrics established for each Education Outcome.

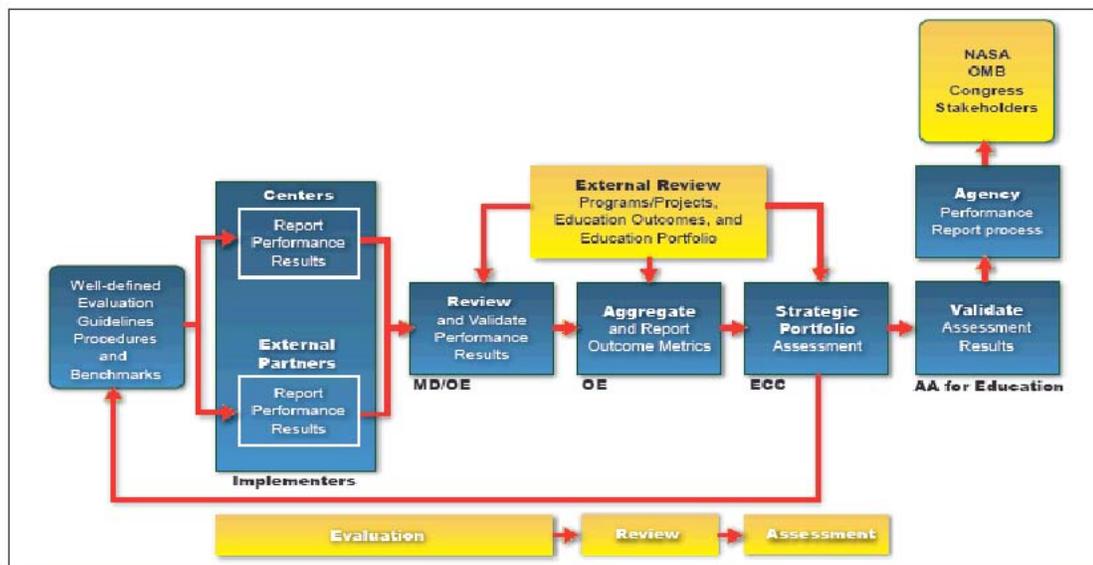


Figure 4 – Monitoring and Evaluation

In carrying out its role of assessing and guiding the total portfolio, the ECC must have the ability to:

- Measure performance, including key performance indicators and metrics.
- Monitor ongoing status of operations events, and resources.
- Analyze “what-if” scenarios using actual historical data and simulating likely outcomes.
- Set performance goals at any level of the organization.
- Establish measures and criteria for monitoring progress.
- Gauge the overall health of Agency education efforts.
- Solicit input from external reviewers on the status of the overall portfolio and future trends/needs in STEM education related to NASA’s workforce needs.

Further, evaluating the effectiveness of NASA education’s portfolio requires on-line, near-real-time access to planning, budgeting, analytical and programmatic information to enable rapid decision-making, corrective actions, and the ability to respond in a timely manner to Agency and external stakeholder requests. The decision-making environment requires:

- The use of one common database and format.
- The ability to trace budget and actual costs from a single project up through the Agency Education Outcomes with linkage to the NASA Strategic Plan.

A link between budgeting and both operational and strategic planning.
Connectivity with the Core Financial used by the Finance Organization, Mission Directorates, Mission Support Offices, and Centers.

Assessments and audits using this same database.

A range of processes will be used to capture the total picture of education across NASA and to assess the education portfolio for effectiveness in achieving the Outcomes, linkages within the framework, quality, impact, and comprehensiveness. The ECC will employ an appropriate mix of methodologies, ranging from basic quantitative data to qualitative information, to assess the overall condition of the education portfolio.

Relevant information will be centrally aggregated, readily accessible, and carefully analyzed in order to provide responses to requests from a variety of organizations for information concerning NASA education. This information will be used to measure the accomplishment of outcomes for NASA management, OMB, Congress, and other stakeholders. This database utilized to centrally aggregate the information will be maintained by the Office of Education and should be readily available to the entire Agency, including Mission Directorates and Centers for decision-making.

The project managers will be held accountable for the continuous input to the Education database, NEEIS, for capturing annual data and metrics to support Agency-wide roll up and reporting is expected. Project managers are expected to periodically review input to assess progress of activities and to use to make necessary adjustments to project implementation and to meet necessary reporting/reviews.

Outcome-Level Metrics and Reviews

Outcome reviews will employ a variety of mechanisms to assure that activities associated with each Education Outcome align with the education operating principles, yield demonstrable results, and reach intended audiences. Use of external reviewers will be an integral part of outcome reviews to provide NASA with credible information regarding how well its education efforts meet customer needs. Outcome reviews include the results, findings, or conclusions of individual program, project, product, and activity evaluations from within the portfolio. These evaluation results should be used as the foundation to guide funding organizations in making adjustments in the portfolio where appropriate.

Program/Project/Activity Evaluation

Management of education programs/projects, as with all NASA programs/projects, complies with the NASA policy NPR 7120.7 *NASA Institutional/Infrastructure Program/Project Management Processes and Requirements*.

Education program, project, product, and activity evaluation are based on a common set of criteria including performance alignment with the Education Overarching Philosophy and Operating Principles. Evaluation plans will measure intended impact and be scaled appropriately to the size of the investment—"one size does not fit all." Mission Directorates, Centers and the Office of Education regularly monitor and evaluate the programs, projects, products and activities they fund and report the results of those evaluations to their funding organizations and the Office of Education for review by the ECC.

Portfolio Management and Reporting Requirements

The release to NASA Centers of the Education Program Guidance provides additional direction and expectations outlined under the category of Elementary and Secondary Programs for stated fiscal year. Project Managers will be held accountable for the following tasks and deliverables.

Annual performance goals are to be identified, measured and monitored throughout the fiscal year.

Quarterly reports accounting for progress towards the APGs, status of projects to cost, schedule, and deliverables.

Annual review with results of the review used to develop an improvement plan to be integrated within next fiscal year.

Submissions to the online Weekly Activity Report and Education 90-Day report are encouraged.

Continuous input to the Education database, NEEIS, for capturing annual data and metrics to support Agency-wide roll up and reporting is expected.

This approach includes a rigorous evaluation of projects/deliverables as matched to annual performance goals and Outcome Two (2); periodic progress reports on performance metrics; annual performance evaluations using common criteria; and access to performance information for the entire portfolio.

The six Education operating principles are to be included as important element of evaluation. See Section 3.13, Reviews, for description of each of the six operating principles.

Breaking Programs & Projects into Elements

In order to categorize a large program or project encompassing many activities it will be necessary to *disaggregate*. In some cases it may be appropriate to *aggregate* similar activities from one or more projects or programs into an element for categorization. In cases where an element, regardless of size, could be categorized in two or more buckets, the primary *intent* of the element should guide its categorization. The following “buckets” have been identified under Outcome 2 and projects under the Elementary and Secondary Education Program can be expected to support one or more of the “buckets”.

See Section 1.2, under Performance Measures regarding the development of specific objectives and measures under each bucket that will serve as further guidance to projects in development of collecting, tracking and reporting progress.

<i>OUTCOME 2</i>	<i>K-12 focused, although some junior and community college educators may participate in Educator Professional Development experiences.</i>	
2.1 Educator Professional Development--Short Duration	Short-duration professional development experiences at Centers, ERCs, etc. primarily for K-12 educators.	Includes only one-time, short duration professional development for educators, typically short workshops and activities lasting less than 2 days. Do NOT include opportunities and training for pre-service educators.

2.2 Educator Professional Development--Long Duration	Longer-term or sustained professional development experiences offered via distance learning, through series, partners, etc. for primarily for K-12 educators.	Includes professional development experiences lasting longer than 2 days or offered over an extended period of time. Do NOT include opportunities and training for pre-service educators.
2.3 Curricular Support Materials	Development and distribution of educator resources for use in formal education settings; Educator Guides, Briefs, wallsheets, textbooks, web-based lesson plans and activities for K-12.	Includes printed and electronic materials intended for use in formal education and linked to national standards. This includes tools for educators (briefs, guides, etc.), wall sheets, text book collaborations, web-based lessons, web challenges, etc. List only products and materials that 1) are still in development or active use (providing workshops, active distribution as opposed to archived or passive distribution); 2) are less than 2 years old, even if still in passive distribution. For web-based products, list only those still in routine or active use and in maintenance.
2.4 Student Involvement K-12	Opportunities for K-12 students to actively participate in instructional NASA opportunities and capitalize on unique NASA facilities and personnel.	Includes active instruction and engagement of K-12 students with specific learning objectives, typically associated with classroom teams and/or teachers. This includes summer "intern" activities (e.g. INSPIRE), challenges, flight payload opportunities, competitions, etc.

2.2 Program Schedule

Plans

All projects that are funded under the Elementary and Secondary Education Program are required to complete and submit documentation under NPR 7120.7 *NASA Institutional/Infrastructure Program/Project Management Processes and Requirements*. The annual performance plan for projects is to be submitted no later than the first week of November

in each fiscal year to the identified HQ E&S Program Manager and the Mission Directorate Education Lead. In turn, these persons will review and share with the Deputy Assistant Administrator for Education Programs for additional comment. Program Directors and Project Managers will then discuss any necessary revisions and each Project Plan should then be approved no later than final week of November.

Reviews

Projects have a defined schedule for review and reporting. See Section 3.13 for complete description of these elements.

Grants and Services

Grants, cooperative agreements and contracts can be expected as part of the overall operations and contribution of performance by the Elementary and Secondary Education Program and its projects. Rules, requirements, and regulations as outlined by NASA Grant and Procurement Offices are to be followed.

The Elementary and Secondary projects from the HQ Office of Education have identified the following major grant activities over the next 24-months. Grantees shall provide annual progress reports to NASA which are examined and approved/disapproved by the project managers. Grantees are expected to provide additional input for the purpose of OMB and Congressional reporting requirements.

The strategy for any major acquisitions under the Elementary and Secondary Education Plan will be through a competitive process.

Project: Aerospace Education Services Project (AESP)

Grantee/Cooperative Agreements: Oklahoma State University **Purpose:** Provide AES services nationwide from all NASA Field Centers **Performance Period:** A 12-month extension from 07/01/06 – 06/30/07 has been approved along with transfer from HQ to LaRC as technical officer.

Project: Educator Astronaut (EA)

Grantee/Cooperative Agreements: Oklahoma State University **Purpose:** Program Support (1 contractor) to provide administrative and management support to the EAP at the HQ level **Performance Period:** July 1, 2005 – June 30, 2006. A 12-month extension to from July 1, 2006 to June 30, 2007 has been approved.

Project: Education Flight Projects

Grantee/Cooperative Agreements: Oklahoma State University, Teaching from Space **Purpose:** Provide unique educational content and experiences based on human space flight **Performance Period:** February 1, 2006 – January 31, 2007. Technical officer function being transferred from HQ to JSC, with intent by JSC to release new solicitation and award before the end of the performance period.

Grantee/Cooperative Agreements: University of California – San Diego (UCSD) for ISS EarthKAM **Purpose:** UCSD oversees and manages the entire project. The UCSD Mission Operations Center operates 4 EarthKAM missions per year. **Performance Period:** 5-year grant, ending August 31, 2006; however, a 3-month no-cost extension has been approved (thru November 2006) in order to complete independent evaluation and transition from HQ to JSC as technical officer

Project: Interdisciplinary National Science Program Incorporating Research and Education Experiences

Grantee/Cooperative Agreements: NA (See NOTE)

Purpose: Program Management Support **Performance**

Period: FY2006

Project: NASA Explorer School (NES)

Grantee/Cooperative Agreements: NRESS **Purpose:** Support travel and onsite activities for NES Student Symposium and NES Summer workshop travel for teachers **Performance Period:** FY2006

Grantee/Cooperative Agreements: Wheeling Jesuit University **Purpose:** NES Evaluation **Performance Period:** Third year of a 3 year grant, expires Sept. 30, 2006; New contractor services expected by to be competed and awarded by October 2006.

Grantee/Cooperative Agreements: National Science Teachers Association **Purpose:** Data, grant, stipend, conference management, Help Desk, Application website and administration **Performance Period:** 04/15/05 -04/14/07

Grantee/Cooperative Agreements: U.S. Space and Rocket Center **Purpose:** NES Sustainability Conference **Performance Period:** 06/01/05 – 05/31/07

Grantee/Cooperative Agreements: Oklahoma State University **Purpose:** NES and DLN Coordinators **Performance Period:** Five-year grant, expires June 30, 2006. A 12-month extension approved from 07/01/06 – 06/30/07

Grantee/Cooperative Agreements: U.S. Satellite **Purpose:** NASA -Data Delivered -LIVE, short courses for NES **Performance Period:** 06/01/05 – 05/31/07

Grantee/Cooperative Agreements: San Jose State University Foundation **Purpose:** NES Pre-algebra program **Performance Period:** 06/15/05 – 05/14/07

Grantee/Cooperative Agreements: Cislunar Aerospace **Purpose:** Development of Moon Math modules **Performance Period:** 07/01/05 – 06/30/07

Grantee/Cooperative Agreements: Center for Image Processing in Education **Purpose:** Workshops and training **Performance Period:** 06/01/05 – 05/31/07

Grantee/Cooperative Agreements: National Alliance of State Science and Math Coalitions **Purpose:** State Partnership Grants **Performance Period:** 8/15/05 – 8/14/07

Grantee/Cooperative Agreements: West Liberty State College **Purpose:** Revision of NASA teacher guides **Performance Period:** 05/15/05 -05/14/2007

Grantee/Cooperative Agreements: Lawrence Hall of Science, University of California, Berkeley **Purpose:** Sustained professional development for NES **Performance Period:** 06/01/05 – 06/30/07

Project: NASA Science, Engineering, Mathematics and Aerospace Academy

Contractor: Paragon TEC, Inc. **Purpose:** Manage the National SEMAA Office and day-to-day operations of 24 SEMAA sites via sub-contract agreements with NASA and assist NASA in coordination of the SEMAA project nationwide **Performance Period:** January 2002 – January 2007

Contractor: Lockheed Martin Information Technology **Purpose:** Manage the installation, courseware, software, staff training and hardware upgrades as well as technical support and maintenance of the 34 Aerospace Education Laboratories (AELs) nationwide that support the SEMAA program. This contract also covers Lockheed's management of the Mobile Aerospace Education Laboratory (MAEL). The MAEL is a mobile version of the AEL; in this one of a kind 53' trailer, visitors can engage in the experience of exploration and discovery. The MAEL serves as an ambassador for the SEMAA program. **Performance Period:** July 2002 – July 2007

Contractor: SGT, Inc **Purpose:** Administration, implementation and technical support for the management of the SEMAA project which includes the AELs nationwide **Performance Period:** Ongoing (2001-Present)

2.3 Resources

***NOTE:** Until Education Project Realignment is complete, the information contained in this section on resources, to include Centers and civil service workforce levels is*

The Elementary and Secondary Program will continue to implement a systemic restructuring of budgets to realize efficiencies, cost savings and reallocation. A business model that includes cost-sharing, sunrise-sunset provisions to funded projects, and insertion of standard processes, tools, and reporting will continue to be implemented.

3.0 SUBPLANS

3.1 Controls and Compliance

The NASA Education Strategic Coordination Framework developed by the Education Coordinating Committee (ECC) is intended to ensure implementation of the Education strategic plan and to offer expanded detail to the standards identified in NASA Procedural Requirement NPR 7120.7 *NASA Institutional/Infrastructure Program/Project Management Processes and Requirements* and NPD 1000.0 *NASA Strategic Management and Governance Handbook*.

The Elementary and Secondary Education Program control and compliance process includes reporting and reviewing performance against baselines (as detailed in this document); evaluating alternatives; developing disciplined processes for considering, approving and implementing changes to official baselines; and assuring positive feedback on all directions and decisions. The program also provides a uniform system of documentation and assures clear and consistent communications throughout the program community on project progress, status, and issues. The integrated operation of these functions furnishes the means to determine the harmony of actual and planned cost, schedule, and performance goals during development and implementation by verifying whether everything is occurring in accord with baseline plans. The program manager reports major changes with all project plans to Office of Education AA and Education Coordinating Committee.

Ultimate responsibility for the effectiveness of program management control rests with the program manager. Delegation of authority, definitions of roles and assignments of responsibilities carry with them the terms of accountability.

Project funding shall be evaluated mid-year (prior to start of third quarter of the fiscal year) relative to the demonstrated performance of the project team and to the educational value of the project's activities. Projects not meeting their deliverables, schedule or other commitments, or having insufficient alignment with NASA outcomes and objectives, may have their funding reduced or eliminated.

This portfolio management approach will provide information necessary for reallocation of resources; sunsets to projects, if necessary; and ensure a coordinated, non-duplicative set of Elementary and Secondary Education projects that work together to achieve NASA's education outcomes.

3.2 Relationships To Other Programs, Projects, Activities and Agreements

3.2.1 Internal

The success of NASA's education portfolio depends upon strategic planning across the Agency. Close coordination through high-performing teams is required among NASA's Office of Education, Mission Directorates, Centers, the Office of Human Capital Management, the Office of Diversity and Equal Opportunity, and other Mission Support offices

The Education Strategic Framework is a strategic management tool that allows the Agency to monitor participant movement through education activities, with each category leading to the next. Education programs and projects draw from the category below them – as a key source for participants – and they connect participants to the category above them – providing a more experienced and focused group and creating a measurable pipeline.

Close and effective consultation, coordination, and cognizance among all entities – Education Divisions, Mission Directorates, and Centers – as aligned towards Outcome 2 or which pull or push audiences from the Elementary and Secondary sector are critical to the optimal fulfillment of NASA's objectives relative to overall education investment.

The six projects currently funded under the elementary and secondary education program must develop effective mechanisms for interfacing with one another and across the other internal stakeholders at the Division, Mission Directorate and Center levels. The same expectation applies to all projects with similar target audiences and focus on Outcome 2. Section 1.1 provides additional detail.

3.2.2 External

The strategic framework and portfolio approach enables NASA to proactively seek strategic partnerships, cooperative agreements, and entrepreneurial relationships, and utilize announcements of opportunity to address continuity gaps in the portfolio.

Professional discipline organizations, industry partners, academic institutions, museums, science

centers, and federal agencies such as the National Science Foundation and National Institutes of Health, the Department of Education, and the Department of Energy, all invest in programs to enhance STEM education. Included under this area are agreements with International Space Partners and development and implementation of educational endeavors. Innovative approaches to include digital as well as more traditional channels and which have broad reach and impact from cost and scalability standpoint are encouraged.

Specifically for the Elementary and Secondary Education Program, strategic alliances, formal partnerships, and customized activities and events under funded projects will be continuously strengthened, new ones sought, and all monitored and reported towards accomplishment of ***Outcome 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers and faculty.***

The offices of Legislative, Public Affairs, and External Relations are to be appropriately involved in endeavors targeting external entities.

3.3 Budget and Acquisition Strategy

The Elementary and Secondary Education Program is composed of educational projects targeting students and educators at the engagement and educate levels of involvement in the OE Education Framework. New ideas and projects are encouraged through NASA Research announcement (NRA), Cooperative Agreement Notices (CAN), Request for Proposals (RFP), and Request for Enterperneurial Offers (REO).

Procurement mechanisms will result in grants, cooperative agreements and contracts with potential partners both inside and outside of academia. The use of competitive sourcing is strongly encouraged for all projects in order to provide opportunitis for all potential partners and to assure maximum value for the taxpayer.

Each Elementary and Secondary project is expected to have developed acquisition strategies that will maximize their abilities to meet project goals and milestones in support of the OE Education Framework and Outcomes.

3.4 Technology Strategy

Project managers are encouraged to build a technology strategy within plans, beginning with review of current activities to see where future efficiencies, reach, and impact might be gained through technology-based applications and infrastructures. Consultation with and linkage with the eEducation Program and Project Managers is encouraged as strategy is developed. Accordingly, budgeting for IT-related infrastructure (e.g., web sites, Portal) and electronic dissemination (e.g., 508 compliancy and meta-tagging of products) should be factored into project plans.

The NASA eEducation Program has been identified as a cross-cutting function across Elementary and Secondary Education and the other two education divisions; it effectively addresses all four levels of involvement as depicted in the Education Strategic Framework. eEducation sustains the research and development of technology applications, products, and services and to implement technology-enriched infrastructures in facilitating the appropriate and effective technology-based

applications to enhance the educational process for formal and informal education. The eEducation Program portfolio includes the assets of the NASA Learning Technologies (NLT) research and development (R&D) and evaluation; the education file on the NASA TV Public Services channel and the NASA Education Services channel; Web services, including the NASA public portal (www.nasa.gov) and education home pages; the suite of television and Web-based instructional series; and electronic- and site-based dissemination networks such as the Central Operation of Resources for Educators (CORE). Mission Directorate and NASA Education program-funded projects contribute to the overall portfolio of activities under eEducation.

Specific ways where collaboration with eEducation might support Elementary and Secondary Program/Projects include:

- NETS to review, adapt, produce, and disseminate elementary and secondary education project content on the NASA Web site (portal) in the educator, student, and kids sections. (Inspire and Engage)

- pursue R&D to enable new learning environments using simulations, visualizations, immersive environments, game-playing, and learner networking (Educate and Engage)

- target development of modeling and visualization tools that are known to support best practices of inquiry-based learning. When modeling and visualization tools are used for authentic, ill-defined investigations, learners at both grade school and university levels can be engaged in making expert-like choices and decisions for their research. (Educate and Engage)

- highlight the amazing things that only NASA can do through the NASA TV education channel and use of the Web, including podcasting. Instructional design of events that are informative, exciting and interactive. (Engage)

3.5 Cooperation and Commercialization

NASA will build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission. The following efforts will be targeted and enhanced by projects funded within the E&S Program:

- Pursue partnerships to support the Elementary and Secondary Program and Outcome Two through talents and resources of government, industry, and private foundations. Dividing the work into manageable projects built around clearly articulated goals and tightly integrated objectives.

- Leverage technology infrastructures to deliver exploration-, science-, and aeronautics-related content to audiences; and partner with Mission Directorates,

- professional education organizations and others to create rich, effective learning experiences and connections for range of K-12 audiences.

NASA will release at least twice a year a request for entrepreneur offers, seeking one or more unfunded collaborations with organizations that would enhance NASA's ability to achieve its educational goals. Specifically, NASA will seek proposals for creating and managing innovative activities, events, products, services, or other types of formal or informal education methods for the purpose of disseminating information nationally about NASA's projects and programs. It is intended that this request for entrepreneurial offers will result in the establishment of one or more non-reimbursable Space Act Agreements that will define the full roles and responsibilities of

NASA and the proposing organization(s).

Project Managers are advised to reflect how the REO opportunities could best be leveraged to achieve more significant outcomes than would otherwise be possible and to extend project impacts by taking advantage of the synergies generated by the competencies and resources of carefully selected partners.

3.6 Data Management and Distribution

For the great majority of E&S projects, the Office of Education does not collect any data as specified by Section 3.6 of the Program Plan template.

For those Elementary and Secondary flight projects that will be gathering and managing data, these will align with all of the requirements as specified in NPR 7120.5D, and will address the data being captured and its availability.

3.7 Safety And Mission Assurance

Safety is the first consideration before any other Agency or organizational goal or objective. Health and Safety are a ratable element in the E&S Program Manager's annual performance plan.

The Elementary and Secondary Education program adheres to standards of mission safety that are promulgated for all employees of the National Aeronautics and Space Administration and its Field Centers. In addition, the E&S programs, two space flight oriented projects: Education Flight Projects and the Educator Astronaut program, will adhere to all NASA regulations and NPD's concerning both hardware and software aspects of the educational projects.

Elementary and Secondary projects will develop safety and mission assurance plans as needed that will identify all activities such as safety, reliability and maintainability, quality assurance, software assurance (including IV&V), environmental related design and test including orbital debris mitigation, program surveillance, failure detection, isolation, and recovery, and failure reporting/resolution, and hazard analysis and mitigation, which are used to ensure the success and safety of the mission.

3.8 Risk Management Strategy

Continuous risk management will be conducted through regular reviews and updates to the program, project and subproject plans. A robust performance and budget data integration process will be applied across the projects that are consistent with program requirements. This process will be designed to provide OE management with timely data to anticipate potential areas where programmatic performance goals and milestones may not be met with the current funding or schedule. This risk management process will provide management with timely data in order to institute program/project schedule, cost, and/or content corrections.

NASA's Elementary and Secondary Education is a relatively low risk program. The primary risk is a loss of affiliation with principal participants resulting in the loss of opportunity to reach the targeted audience. Loss of affiliation is most often attributed to a lack of informational material currency, to funding disruption or stoppage, or to issues related to technology deployment.

NASA Education will monitor and mitigate program risk through continual evaluation of program content and delivery method, adjusting the content and deployed technology to assure currency. Also, the Elementary and Secondary Program Manager will carefully monitor funding levels and flow to ensure continual engagement with current and intended funding recipients.

3.9 Environmental Impact

The Elementary and Secondary program manager and project team members adhere to environmental compliance requirements, which are promulgated for all employees of the National Aeronautics and Space Administration and its Field Centers.

3.10 Institutional and Logistics

Center Education Offices are responsible for implementing the NASA Elementary and Secondary program through a portfolio of funded projects. The Elementary and Secondary Program-funded Centers and external partners are responsible for execution of projects and for securing needed institutional assets including logistics and supply.

3.11 Physical and Information Technology Security

The E&S Program complies with physical and information technology security requirements as established by the Chief Information Officer (CIO). Additionally, E&S project managers monitor changes to requirements and make necessary changes to security plans and procedures to ensure that the project's security controls and implementation activities are well-matched to threat assessments related to physical and information security.

3.12 Verification and Validation

Managing each of the three Outcomes within the Agency education portfolio requires a cross-cutting review that encompasses all projects, products, and activities, whether originating in the Office of Education, the Mission Directorates, or the Centers. The Office of Education will assign a staff member for each Outcome to conduct strategic analysis and planning, establish measurable metrics, and implement an evaluation plan. The staff member for each Education Outcome will report on the Agency's progress toward achieving that Outcome to the AA for Education and the ECC.

Outcome reviews will employ a variety of mechanisms to assure that activities associated with each Education Outcome align with the education operating principles, yield demonstrable results, and reach intended audiences. Use of external reviewers will be an integral part of outcome reviews to provide NASA with credible information regarding how well its education efforts meet customer needs. Outcome reviews include the results, findings, or conclusions of

individual program, project, product, and activity evaluations from within the portfolio.

3.13 Reviews

The E&S Program management approach will provide information necessary for realization of efficiencies, cost savings and reallocation of resources; sunsets to projects, if necessary; and ensure a coordinated, non-duplicative set of Elementary and Secondary projects, products and activities that work together to achieve NASA's education outcomes.

Use of external reviewers will be an integral part of outcome reviews to provide NASA with credible information regarding how well its education efforts meet customer needs. Outcome reviews include the results, findings, or conclusions of individual program, project, product, and activity evaluations from within the Elementary and Secondary Education Program. These evaluation results should be used as the foundation to guide funding organizations in making adjustments in the Program where appropriate.

Approach includes a rigorous evaluation of projects/deliverables as matched to annual performance goals and targeted program/project outcomes; periodic progress reports on performance metrics; annual performance evaluations using common criteria; and access to performance information for the entire Elementary and Secondary Education Program portfolio.

All projects funded under the Elementary and Secondary Education Program will be required to undergo the following reporting and review activities.

Annual performance planning and reporting is required and annual performance goals are to be identified, measured and monitored throughout the fiscal year.

Monthly reports are submitted and quarterly reviews are held.

Annual review with results of the review used to develop an improvement plan to be integrated within its next annual performance plan.

Submission to the online Weekly Activity Report is encouraged.

Continuous input to the Education database, NEEIS, for capturing annual data and metrics to support Agencywide roll up and reporting is expected.

More complete description of the review and reporting elements are listed, below.

- **Weekly Activity Report (WAR)**

Projects are encouraged to utilize the online Weekly Activity Reporting tool to communicate key events/activities that have happened during week or key events expected to happen in the near term. A 90-day report is assembled for the NASA Administrator on a monthly basis and items that look forward over the 90-day period are compiled into this report for the Administrator and shared with the Agency Senior Leadership.

- **Monthly Status**

By the final Wednesday of each month, each project shall submit a status brief. The brief shall provide explanation within the four areas of Cost, Schedule, Technical, and Management Issues and using the (green, yellow, and red) color key, provide status with explanations. In addition, accomplishments for the time period should be listed. This

status will be used to input progress into ERASMUS and to assess overall monthly status of the Elementary and Secondary Education Program to report to the AA for Education.

- **Quarterly Review**

The projects shall undergo review each quarter of the progress. Quarterly reviews shall be conducted by Program/Project Manager. The reviews shall consist of a demonstration of the state of the project's technology and deliverables, an assessment of the project's status relative to its schedule, and an evaluation and possible adjustment of the project's direction and deliverables.

- **Semi-annual Review of Performance**

Project funding shall be evaluated mid-year (prior to start of third quarter of the fiscal year) relative to the demonstrated performance of the project team and to the educational value of the project's technology.

- **Annual Review of Performance**

Reviews will be based primarily on written documentation summarizing the goals, objectives, organization, resources, and accomplishments of each Project. The results of the review will be used to develop an improvement plan to be integrated within its next annual performance plan.

The final review will address the six criteria. These principles are:

Relevance: To effectively strengthen the Nation's STEM workforce, NASA must implement activities that are useful to the education community and that strengthen their ability to engage students in the STEM pipeline.

Content: Education investments use NASA content, people or facilities to involve educators, students, and/or the public in NASA science, technology, engineering, and mathematics.

Diversity: NASA strives to ensure that underrepresented and underserved students participate in NASA education and research programs to encourage more of these students to pursue STEM careers. Programs and projects are representative of American demographics, engage underrepresented and underserved minorities, women, and persons with disabilities, and reflect an atmosphere of equity, balance, and inclusiveness. NASA will continue to focus on enhancing the capabilities of Minority Serving Institutions to contribute to the research needs of the Agency.

Evaluation: Education investments document their intended outcomes and use metrics to demonstrate progress toward and achievement of these outcomes and annual performance goals. Evaluation methodology is based on reputable models and techniques appropriate to the content and scale of the targeted activity, product, or program.

Continuity: Projects and activities draw from audiences that have already demonstrated interest in NASA and connect participants to the next level of engagement. A blend of projects and activities encourage continued student affiliation with NASA throughout their academic career.

Partnerships/Sustainability: Education investments leverage and achieve sustainability through their intrinsic design and the involvement of appropriate local, regional, and/or national partners in their design, development, or dissemination. As appropriate, key aspects of projects and activities are replicable and demonstrate potential for continuation beyond the period of direct NASA funding.

Finally, the individual E&S Program and projects will be subject to review and assessment per NASA Education guidance articulated under the Strategic Framework and as further communicated based on the results of the Education Coordinating Committee working group on evaluation.

3.14 Education and Public Outreach Plan

This project falls under the umbrella of NASA Education and therefore the complete nature of the program and its scope are education and fall under the guidelines and requirements thereof.

3.15 Termination Review Criteria

Project funding shall be evaluated mid-year (prior to start of third quarter of the fiscal year) relative to the demonstrated performance of the project team and to the educational value of the project's technology. Projects not meeting their deliverables, schedule or other commitments, or whose technology has or is clearly becoming obsolete, or has insufficient alignment with NASA education goals and objectives may have their funding reduced or eliminated. Such a proposed action will be forwarded by the Program Manager and acted upon only upon concurrence and/or further direction by the NASA Education Director, Elementary and Secondary Education.

3.16 Deviations and Waivers

Current NPR 7120.5C "grandfather" clause¹ for a program in implementation phase does not apply to education programs because NASA Education was not covered under NPR 7120.5B.

The E&S Program needs to deviate from NPR 7120.5C requirements for formulation and approval documents. The E&S program was already in implementation and had multiple projects in implementation and evaluation phases when NPR 7120.5C became effective.

¹ NPR 7120.5C NASA Program and Project Management Processes and Requirements, Preface, P.2c. Applicability states: The requirements of this document are applicable to all Programs and Projects currently in formulation as of the effective date. Programs and Projects in Implementation Phase at the time of approval of NPR 7120.5C can request permission from the appropriate Governing Program Management Committee (PMC) to be allowed to continue operating under NPR 7120.5B. However, for programs or projects in Implementation Phase, all or portions of this document can be levied on the program or project at the discretion of the Mission Directorate, Mission Support Office, or Center.

3.17 Change Log

Date	Author	Amendment Details
4-25-06	Shelley Canright	Version 2 --reviewed by the Elementary and Secondary Project Managers with initial support by staff persons in drafting proposed content to certain elements of various sections.
5-25-06	Shelley Canright	Version 3 – Additional revisions per feedback from Stofan.
6-16-06	Gregory Mann	Version 3.1 – coordinating and aligning with other program plans.
6-21-06	Shelley Canright	Version 4 – Additional reviews and feedback from project managers.
6-21-06	Gregory Mann	Version 4.1 – Minor tweaks.

3.18 Appendices
APPENDIX A -NASA Office of Education
Outcomes, Annual Goals, & Measures,
FY 06& FY07

FY 06	FY 07
Outcome One: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA’s strategic goals through a portfolio of programs.	Outcome One: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA’s strategic goals through a portfolio of programs.
APG 6ED3 Award 1,000 competitive scholarships, fellowships, and research opportunities for higher education students and faculty in STEM disciplines.	APG 7ED1 Award 1,200 competitive internships, fellowships, and research opportunities for higher education students and faculty in STEM disciplines.
APG 6ED6 Award 250 competitive scholarships, internships, fellowships, and research opportunities for underrepresented and underserved students, teachers and faculty in STEM disciplines.	APG 7ED2 Award 500 competitive scholarships, internships, fellowships, and research opportunities for underrepresented and underserved students, teachers and faculty in STEM disciplines.

APG 6ED7 Provide 50 grants to enhance the capability of 25 underrepresented and underserved colleges and universities to compete for and conduct basic or applied NASA-related research.	APG 7ED3 Provide 100 grants to enhance the capability of 50 underrepresented and underserved colleges and universities to compete for and conduct basic or applied NASA-related research.
APG 6ED4 Complete a retrospective longitudinal study of student participants to determine the degree to which participants entered the NASA workforce or other NASA-related career fields.	APG 7ED4 Complete a retrospective longitudinal study of student participants to determine the degree to which participants maintain affiliation with NASA through the pipeline.
APG 6ED5 Collect, analyze, and report longitudinal data on student participants to determine the degree to which participants enter the NASA workforce or other NASA-related career fields.	APG 7ED5 Collect, analyze, and report longitudinal data on student participants to determine the degree to which participants enter the NASA workforce or other NASA-related career fields.
APG 6ED11 Collect, analyze, and report the percentage of grantees that annually report on their accomplishments.	Efficiency Measure 1 Collect, analyze, and report the percentage of grantees that annually report on their accomplishments.

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FY 06	FY 07
Outcome One: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA’s strategic goals through a portfolio of programs.	Outcome One: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA’s strategic goals through a portfolio of programs.
APG 6ED12 Peer review and competitively award at least 80%, by budget, of research projects.	Efficiency Measure 2 Peer review and competitively award at least 85%, by budget, of research projects.
PART Measure 5. Number of higher education institutions that align their NASA research and development activities with STEM teacher preparation departments to improve STEM teacher quality.	PART Measure 5. Number of higher education institutions that align their NASA research and development activities with STEM teacher preparation departments to improve STEM teacher quality.
PART Measure 6. Percentage of new NASA employees that participated in a NASA education program.	PART Measure 6. Percentage of new NASA employees that participated in a NASA education program.

PART Measure 7. Percentage of NASA higher education student participants who are studying or working in space-related fields five years after their involvement has ended and claim their NASA education experience influenced or reinforced their career decisions.	PART Measure 7. Percentage of NASA higher education student participants who are studying or working in space-related fields five years after their involvement has ended and claim their NASA education experience influenced or reinforced their career decisions.
PART Measure 8. Percentage of underrepresented and underserved student participants in NASA higher education programs who are studying or working in space-related fields five years after their involvement has ended and claim their NASA education experience influenced or reinforced their career decisions.	PART Measure 8. Percentage of underrepresented and underserved student participants in NASA higher education programs who are studying or working in space-related fields five years after their involvement has ended and claim their NASA education experience influenced or reinforced their career decisions.
PART Measure 9. Percentage of higher education program participants who have participated in NASA elementary or secondary programs.	PART Measure 9. Percentage of higher education program participants who have participated in NASA elementary or secondary programs.

FY 06	FY 07
Outcome One: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA’s strategic goals through a portfolio of programs.	Outcome One: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA’s strategic goals through a portfolio of programs.
PART Measure 12. Percentage of programs that have developed and annually measure their effectiveness using performance metrics relating to NASA's mission and education goals.	PART Measure 12. Percentage of programs that have developed and annually measure their effectiveness using performance metrics relating to NASA's mission and education goals.
PART Measure 13. Percentage of grants awarded on a competitive basis.	PART Measure 13. Percentage of grants awarded on a competitive basis.
PART Measure 14. Percentage of grantees that annually report on their accomplishments.	PART Measure 14. Percentage of grantees that annually report on their accomplishments.

FY 06	FY 07
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<p>Outcome Two: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.</p>	<p>Outcome Two: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers and faculty.</p>
<p>DELETE APG 6ED1 <i>[Conduct 12 Educator Astronaut workshops, involving approximately 240 educators.]</i></p>	<p>APG 7ED6 Conduct 10 Educator Astronaut workshops, involving approximately 200 educators.</p>
<p>DELETE APG 6ED8 <i>[Select and support 50 additional schools to participate in the NASA Explorer Schools program, maintaining the total number at 150.]</i></p>	<p>APG 7ED7 Select and support 50 additional schools to participate in the NASA Explorer Schools program, maintaining the total number at 100.</p>
<p>DELETE APG 6ED2 <i>[Select approximately 150 student experiments, involving approximately 1,500 students, to participate in the Flight Projects program.]</i></p>	<p>APG 7ED8 Select 100 student experiments, involving 1,000 students, to participate in the Flight Projects program.</p>
<p>APG 6ED11 Collect, analyze, and report the percentage of grantees that annually report on their accomplishments.</p>	<p>Efficiency Measure 1 Collect, analyze, and report the percentage of grantees that annually report on their accomplishments.</p>
<p>APG 6ED12 Peer review and competitively award at least 80%, by budget, of research projects.</p>	<p>Efficiency Measure 2 Peer review and competitively award at least 85%, by budget, of research projects.</p>
<p>PART Measure 1. Percentage increase in number of elementary and secondary student participants in NASA instructional and enrichment activities.</p>	<p>PART Measure 1. Percentage increase in number of elementary and secondary student participants in NASA instructional and enrichment activities.</p>
<p>PART Measure 2. Percentage increase in number of elementary and secondary educators utilizing NASA content-based STEM materials and programs in the classroom.</p>	<p>PART Measure 2. Percentage increase in number of elementary and secondary educators utilizing NASA content-based STEM materials and programs in the classroom.</p>
<p>FY 06</p>	<p>FY 07</p>
<p>Outcome Two: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.</p>	<p>Outcome Two: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers and faculty.</p>

PART Measure 3. Level of student learning about science and technology resulting from elementary and secondary NASA education programs.	PART Measure 3. Level of student learning about science and technology resulting from elementary and secondary NASA education programs.
PART Measure 4. Level of student interest in science and technology careers resulting from elementary and secondary NASA education programs.	PART Measure 4. Level of student interest in science and technology careers resulting from elementary and secondary NASA education programs.
PART Measure 10. Number of people reached via e-education technologies per dollar invested.	PART Measure 10. Number of people reached via e-education technologies per dollar invested.
PART Measure 12. Percentage of programs that have developed and annually measure their effectiveness using performance metrics relating to NASA's mission and education goals.	PART Measure 12. Percentage of programs that have developed and annually measure their effectiveness using performance metrics relating to NASA's mission and education goals.
PART Measure 13. Percentage of grants awarded on a competitive basis.	PART Measure 13. Percentage of grants awarded on a competitive basis.
PART Measure 14. Percentage of grantees that annually report on their accomplishments.	PART Measure 14. Percentage of grantees that annually report on their accomplishments.

FY 06	FY 07
Outcome Three: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.	Outcome Three: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.
DELETE APG 6ED9 <i>[Digitize and metatag up to 10% of NASA's approved learning materials to be delivered using technology-enabled learning systems.]</i>	APG 7ED9 Digitize and meta-tag 10 percent of NASA's approved learning materials to be delivered using technology-enabled learning systems..
DELETE APG 6ED10 <i>[Award competitive grants to NASA Centers and informal education partners to conduct up to 15 Explorer Institute workshops.]</i>	APG 7ED10 Award competitive grants to NASA Centers and informal education partners to conduct 10 Explorer Institutes projects.

APG 6ED11 Collect, analyze, and report the percentage of grantees that annually report on their accomplishments.	Efficiency Measure 1 Collect, analyze, and report the percentage of grantees that annually report on their accomplishments.
APG 6ED12 Peer review and competitively award at least 80%, by budget, of research projects.	Efficiency Measure 2 Peer review and competitively award at least 85%, by budget, of research projects.
PART Measure 10. Number of people reached via e-education technologies per dollar invested.	PART Measure 10. Number of people reached via e-education technologies per dollar invested.
PART Measure 11. Degree to which NASA engages the informal education community with NASA science and technology.	PART Measure 11. Degree to which NASA engages the informal education community with NASA science and technology.
PART Measure 12. Percentage of programs that have developed and annually measure their effectiveness using performance metrics relating to NASA's mission and education goals.	PART Measure 12. Percentage of programs that have developed and annually measure their effectiveness using performance metrics relating to NASA's mission and education goals.
PART Measure 13. Percentage of grants awarded on a competitive basis.	PART Measure 13. Percentage of grants awarded on a competitive basis.

FY 06	FY 07
Outcome Three: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.	Outcome Three: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.
PART Measure 14. Percentage of grantees that annually report on their accomplishments.	PART Measure 14. Percentage of grantees that annually report on their accomplishments.