

National Aeronautics and Space Administration
Office of Education

Education Advisory Committee Meeting

April 24-26, 2005
Orlando, FL

MEETING REPORT



Douglas R. King
Chairman, Education Advisory Committee



Katie E. Blanding
Executive Director

Report prepared by Joan M. Zimmermann

Table of Contents

Introduction and Welcoming Remarks.....	3
Education Update.....	3
Kennedy Space Center Education Programs and University Research Division	4
Kennedy Space Center Overview.....	6
Report from the NASA Advisory Council.....	7
Working Session.....	7
NASA Strategic Roadmaps.....	8
Managing Education Programs and Projects.....	9
Working Sessions I and II.....	10
Dinner Presentation.....	10
Discussion/Review of Working Sessions.....	11
A Vision to Inspire a Plan for Change.....	13
Discussion/Closing Remarks.....	13

- Appendix A- Attendees*
- Appendix B- Presentations*
- Appendix C- Agenda*
- Appendix D- Membership*

Sunday, April 24, 2005

Introduction and Welcoming Remarks

The Education Advisory Committee met April 24 – 26, 2005, at the Kennedy Space Center, Kennedy Space Center (KSC), Florida. The first session of the meeting was held at the Radisson Port Hotel. The meeting was called to order by the Chair, Mr. Doug King, who welcomed the members. Administrative remarks were made by Dr. Katie Blanding. Dr. Gregg Buckingham, the University Affairs Officer at KSC reviewed the agenda for the next day's session and tour, which took place at KSC.

Dr. Adena Williams Loston, Associate Administrator of Education, welcomed members. She introduced Dr. Jo Anne Vasquez, a new member of the committee, who is the first K-12 teacher to have been appointed by the President to the National Science Board. She then presented Dr. William Harvey, the outgoing chair, with a certificate of appreciation, and introduced Mr. Douglas King as the new chairman of the EAC. Mr. King described his career experience, particularly his close association with the Challenger Learning Centers, and his current leadership position as CEO of the St. Louis Science Center.

Education Update

Dr. Loston updated the EAC on recent changes, such as the confirmation of NASA's new Administrator, Michael Griffin, who served as the Space Department Head at Johns Hopkins University's Applied Physics Laboratory in Baltimore, MD, and a former Chief Engineer at NASA. She emphasized that NASA's current focus is on Return to Flight (RTF) on May 22, the build-out of the International Space Station, and the launch of the Crew Exploration Vehicle (CEV) in 2014. The new Administrator is aiming to close the gap in the Agency's space and aeronautical activities between 2010 and 2014 (ISS and CEV). She reviewed NASA's five national goals and 18 objectives, concentrating on the Education Office's objective, which is to use NASA missions to inspire students and teachers, to engage and educate the public, and to advance the scientific and technological capabilities of the nation.

NASA's 13 roadmapping teams are now looking at different perspectives on accomplishing the President's Vision for Space Exploration. The Office of Education has a representative on each roadmap team, reflecting the pervasive theme of Education throughout the Agency. The Education Office will use these ex officio representatives (among them, EAC members Douglas King and Wayne Johnson) of each roadmap team to comprise the Education Roadmap team. Dr. Loston is one of three co-chairs of this team. There is also an Education program review in progress, evaluating programs on the basis of operating principles. The Education budget is flat, which provides an opportunity for redirection of funds. The new Administrator has plans for restructuring the Agency, and some new ideas for the structure of the NASA Advisory Council (NAC). The NAC will be elevated and will report directly to Dr. Griffin.

Mr. King commented briefly on the changes reported by Dr. Loston, noting that this is an historic time for NASA; the roadmapping teams are plotting out the next 25 years, and therefore the EAC is in an enviable position to shape the future path of NASA Education.

Education will also have a voice on the elevated NAC. While the budget is focused on RTF, other constituencies at NASA may struggle to have their voices heard. He asked members what they would like to accomplish at NASA. Dr. Philip Clay recounted his experience with females in science education, such as separating females from the general school population for math education. He felt much ground had been lost in educating children in technology and science education and that space was one of the areas where the public's imagination might be excited. He hoped NASA could help significantly in this respect. Dr. Senta Raizen agreed that ground had been lost, and was also disturbed by efforts to use religious theory in public schools as a legitimate means to explain the origin of the universe or to supplant Darwin's theory of evolution. Dr. Joanne Vasquez felt that NASA's accomplishments have been taken for granted; teachers must recognize the importance of NASA's abilities to stimulate educational activities. Through her membership in the EAC, she wants to glean knowledge and carry it back to her colleagues. Dr. Loston mentioned that each Agency center has an RTF activity in progress, and in addition, NASA is pulling in museums and science centers, and distributing activity kits to schools, parents and after-school community centers. NASA is also developing video spots for display at Regal Cinema movie theatre centers, and is in the process of inviting students and former Educator-Astronaut candidates to witness RTF.

Dr. Loston provided an update on the Agency's restructuring. The Office of Education is now joined with the Offices of External Relations, Public Affairs, and Legislative Affairs. Center Directors now report directly to the Administrator. A final organization chart should be available in 120 days. Mr. King observed that as the new organization takes shape, the EAC must lend strong support to the Education Office as a defender of the educational thrust. Dr. Loston cautioned that the administrative changes are also in flux. Dr. Harriett Jenkins emphasized the role of Education on the NAC. Dr. Jenkins felt some other strategies may be used to evaluate and assess the impact of NASA's Education Office: how can we get the "Aha" syndrome? Is anyone collecting anecdotes on how NASA is impacting education in the US? Dr. Loston replied that NASA is compiling success stories. Mr. King commented that the Administrator is being careful to focus on the Return to Flight of the Shuttle, for the time being. Dr. Jenkins observed that the Administrator's personal views appear to differ from the Presidential vision. Mr. King and Dr. Loston agreed that Dr. Griffin seemed to be giving positive signals about his commitment to science and education.

Dr. Blanding reviewed some administrative items, and noted that the format should allow for more interaction with the committee, balanced with timely information on new and ongoing activities. She sought recommendations from EAC on Education policy directions, and the sustainability of NASA's educational efforts over time.

Monday, April 25, 2005

Kennedy Space Center Education Programs and University Research Division

Dr. Buckingham presented an update on educational activities at the Kennedy Space Center (KSC). He provided a brief history of the KSC and the evolution of the

infrastructure surrounding the launch services. One of the Center's top programs involves the Tallahassee Department of Education, primarily in teacher training and membership in the Coalition for the Improvement of Math and Science Teaching. The coalition works with legislators to fund teacher training.

Dr. Buckingham presented the current organizational chart for the KSC Education Programs and University Research Division. KSC has put together a team to coordinate resources for student internships for the "pipeline" approach to filling science and engineering needs. The KSC mission and education objectives are aligned and integrated with center activities. There are five new NASA initiatives: the NASA Explorer Schools (NES; 15 of these schools are affiliated with KSC), Educator-Astronaut Programs, NASA Explorer Institutes (informal education), the Science and Technology Scholarship, and the Space Exploration Academy. Thirty-six NES students and their chaperones have been invited to RTF. In June, KSC will host an Educator-Astronaut conference. In the past year, NEI has held a conference on the subject of RTF in conjunction with Johnson, Stennis and Marshall Space Flight Centers, and has displayed and demonstrated artifacts for informal education events.

Education outcome highlights were presented. To fulfill the objective of using NASA-unique strategies and tools to support the K-12 education community's efforts to attract students to the science and engineering fields, KSC has established an Educator Resource Center and Exploration Station. Dr. Raizen asked about content, follow-up and evaluation. Dr. Steve Dutczak (KSC) replied that the content reflects teacher requests. In response to such requests, Kennedy sets up an activity-based workshop, and trains the teacher to run the activity. There is no charge for this professional development service. Follow-up is performed by specialists who visit schools, and by maintaining a mailing list with teachers so that newly emerging, age-appropriate materials can be sent to them when they become available. The materials are tied to state educational standards. Off-site, KSC sends aerospace educators, astronauts, and NASA representatives to Georgia, Florida, Puerto Rico and the Virgin Islands to share NASA science, technology, engineering, and mathematics (STEM) content. In FY04, this activity reached nearly 27,000 teachers and students. In addition, summer internships at KSC help to fulfill the NASA objective of attracting and preparing students for NASA-related careers, and enhancing the research competitiveness of US colleges and universities by providing opportunities for faculty and student research.

KSC is also reaching out to under-represented and underserved students, and has held a research conference with 19 of the current Minority University Research Centers (URCs), which facilitated technical exchanges between participants. KSC also held, in February 2004, a NASA/Minority University Presidents Conference as a ONE NASA event, which resulted in fruitful relationships.

Technology products and services supporting formal and informal education include modes of E-education. These include an Enter the Firing Room website, which contains technical and career information. The CD-based Virtual Lab provides access to high-value scientific equipment, such as a scanning electron microscope, for academic

institutions unable to afford such equipment. Other instruments will be added over time. There is also a Launch Services Program website, and KSC is developing the Kennedy Launch Academy Simulation System, software that puts students in the role of system engineers during a launch countdown. The software requires solution of math and science problems. A “Sim City” interactive computer game based on Mars and the Moon is also being explored.

Recent informal education activities include an RTF conference; 24 states were represented at the event. The new Exploration Directorate has funded one full time employee (FTE) to handle Exploration Education programs at the Center. KSC recently won a \$130K competitive proposal to fund students and faculty to work at KSC, in a 10-week summer program, in Exploration-related areas with grantees in technical work. This will include a workshop to translate ideas into university classroom use. In summary, KSC strives to maintain a balance of programs for educational needs at all age levels. Dr. Loston noted that $\frac{3}{4}$ of the investment is in higher education. Dr. Jenkins observed that most substantial budget cuts seem to have been made in higher education.

KSC Overview

Mr. Jim Hattaway welcomed members on behalf of KSC Director James Kennedy and Deputy Director Woodrow Whitlow. KSC is located on 140,000 acres, with 14,000 employees. Much of the acreage is devoted to a wildlife refuge and the National Seashore. There are 27 state and federally protected species on site, 11 of which are on the threatened or endangered species list. The average salary at KSC is \$60K (compared to the average in Brevard County; \$30K). KSC is one of the 5 largest employers in the state of Florida. The Center is jointly managed by NASA and the U.S. Air Force through a combined Board of Directors. KSC sees its role as building on its heritage, which is launching and recovering human-rated vehicles, and performing payload processing and life science research. KSC’s primary priority is RTF, the first step in the new Exploration mission. The Shuttle is now on the launch pad and has been mated to the external fuel tank. The KSC infrastructure was briefly detailed. Shuttle and ISS programs provide most of the funding for the Center. Mr. Hattaway described the assembly, test, integration and processing activities for spacecraft, flight experiments and payloads. He presented statistics on ISS. There are currently 92 tons of hardware waiting to be launched to ISS over multiple Shuttle missions. KSC also manages the commercial Expendable Launch Vehicle program for the Delta II, Delta IV, Atlas V, Taurus and Pegasus rockets.

Recent robotic missions such as the Mars Spirit and Opportunity rovers were briefly mentioned. KSC plays a critical role in research and development, design and operations of spaceport and range systems and infrastructure for use on Earth or other surfaces. Oxygen generation, food generation, waste disposal, space life sciences (plant physiology), controlled environment changes, monitor and control of flight studies are among the many important subject areas. In terms of the Vision, KSC is most concerned with RTF, completing the build-out of ISS, balanced human and robotic exploration, and affordable and sustainable space exploration. There is concern about closing the (vehicle) gap between 2010 and 2014. KSC is working hard to minimize the impact of this gap. NASA must maintain critical skills. Many KSC employees are technicians, and recipients

of 2-year community college aerospace technician degrees. However, two thirds of NASA civil servants are degreed. KSC provides fellowships to employees for advancing their education. Tuskegee University is involved in plant studies, as is Florida A&M. Program Image provides academic support for students. Tuskegee is also heavily involved with Marshall Space Flight Center. Dr. Raizen questioned the scientific value of ISS. Mr. Hattaway replied that ISS research would serve as preparation for the journey to the Moon and Mars. Mr. John Jordan asked about the flight manifest backlog. Mr. Hattaway replied that 28 more flights will be needed to complete ISS, at a rate of 3-5 flights per year. KSC is also concentrating on managing workforce issues, such as hiring fresh-outs, and monitoring the number of employees eligible for retirement. Dr. Vasquez asked about post-Shuttle planning activities. Mr. Hattaway expressed hope that Exploration efforts would fill this gap, as would the need to re-supply ISS, fulfill needs for new heavy lift capabilities, and autonomous rendezvous. Mr. King commented that the space program appears to be at the point of the computer industry in the 80s; the incipient civilian space program may change the profile of space industry. Dr. Loston described a recent round table discussion with 5th through 8th graders, where students had expressed interest in thinking outside the planet/universe. She remarked on interesting ideas for spherical CEV designs that sprang from students during this discussion.

Report from the NASA Advisory Council (NAC)

Dr. Harvey reported on the most recent meeting of the NASA Advisory Council (NAC). He noted that the intent at that time had been to re-structure the NAC according to the new committee along the guidelines suggested by the Aldridge Report (bifurcation into technology and policy committees). However, with the installation of the new Administrator, the decision has been made to re-form the committee into its original structure, with changes incumbent upon Dr. Griffin's wishes. Education had been a significant component of the original discussion, identifying education as an ongoing interest. The presumption had been to discuss implementation of this idea, however the last NAC meeting was cancelled due to recent administrative changes and a fresh round of decision-making. Dr. Harvey was unsure if any or all of the previous planning for Education as a cross-Agency engagement would be upheld through the transition period. Dr. Loston reiterated that Dr. Griffin intended to elevate the role of the NAC to a direct advisory body for the Administrator's office, and viewed this as a reassuring move.

Working Session

Dr. Bernice Alston invited the EAC to advise NASA on its ongoing strategic and conceptual positioning for Space Exploration, and how Education will fit into this process. For example, the Aldridge report and re-direction of the NASA Vision and mission have been key influences on how the Office is now managed. The business process in the Office of Education must be set up to adequately support the vision for Space Exploration. In view of the fact that the Office was constructed to support the entire Agency, the Office of Education has had to step back and re-examine how it fits into the broader NASA strategy over the next decades. The Office of Education is therefore now engaged in establishing consistency in its management processes.

NASA Strategic Roadmaps

Dr. Shelley Canright gave a presentation on the progress of NASA's Strategic Roadmap (SR) activities. She reviewed the five national objectives, and 18 strategic objectives, from which the 13 strategic roadmaps have been derived, and provided the definition of a strategic roadmap as a coordinated and comprehensive longitudinal strategy that identifies key objectives of the Agency over the long term. The product hierarchy and requirements flow was displayed graphically, showing how the vision and mission are transformed into strategic plans, core competencies, new initiatives, strategic studies, and ultimately into program and mission requirements. Essential roadmap elements are broad program and research goals, suggested implementation approaches, high-level milestones, options and decision points, and key dependencies on and contributions to other programs. The roadmaps will be submitted for review by the National Research Council on June 1, 2005; however the Education Roadmap will lag behind the others somewhat in order to enfold the data provided by each roadmap. The 13 strategic roadmaps were presented. Strategic Roadmap (SR)-12 is being led by the Education Office. Each roadmap is chaired by a representative from a NASA Center, an Associate Administrator, and an external chair. (*A discussion of NASA's Strategic Roadmaps is available at http://www.nasa.gov/about/strategic_roadmaps.html*). The Office of Education has taken a two-pronged approach: the SR-12 liaisons attend other Roadmap meetings and report back to the SR-12 membership. The SR-12 committee then considers this information to plan within an Environment of Opportunity. Where are key points occurring in the life cycle of the next 30 years? NASA can tell an inspiring and sustained story with this information. The more difficult question is how to implement the strategy. The rationale is to build the excitement in from the beginning, maximize the engagement potential, sustain the interest of the public and channel this interest into the future pipeline of scientists and engineers. SR-12 will consider questions such as "What will the classrooms, museums, and virtual technologies of the future look like? How might advanced technologies be used to advance training and education in 2020 and 2030? How will NASA remain relevant to the Nation's interests in the future?"

The SR-12 membership has been approved, and the first meeting will take place June 1-3, 2005. Most of the liaisons have attended at least one roadmap meeting. Some issues have already come up: pipeline, public engagement (NASA has underused the museum community), risk communication (targeted to higher education), and evaluating technology literacy earlier. Cross-roadmap issues include determination of future NASA careers and needs. How can NASA utilize risk communication to proactively address public concerns? NASA must provide more immersive experiences at earlier career levels.

Dr. Canright asked the committee to split into groups in order to create suggestions for implementation approaches and to define terms for the Environment of Opportunity and Strategic Communications, and to suggest items for developing a "Vision 2025" for future K-12 classrooms, undergraduate programs, and science centers/museums. She distributed a sample page of definitions, high-level strategic recommendations, and tactical recommendations for funding, planning, implementing and aligning activities. A recent Education Request for Information (RFI) resulted in white papers in several areas,

and all responses were written around the concepts of immersive games and simulations. Ms. Carol Ramsey suggested that the Education Advisory Committee propose effective pedagogical practices for bringing about the results identified by NASA in a limited number of focus areas, such as robotics, transportation, etc., that have been identified by the other roadmaps as subjects of critical importance to the advancement of the Exploration vision.

Managing Education Programs and Projects

Mr. Marty Rajk presented a perspective on the practical aspects of managing Education initiatives. A strategic planning framework was displayed from the vision/mission down to implementing/enabling strategies for sound management practices. Key documents feeding the management philosophy are the Strategic Plan, the President's Policy Directive, the Aldridge Report, NASA's Direction for 2005 & Beyond, the NASA Strategic Management Handbook, NASA Program and Project Management Processes and Requirements, and the FY2006 Congressional Budget Justification. The Strategic Objective for NASA Education was reviewed. Some changes have been made to the external presentation of Education's mission. A new emphasis has been made in singling out specific categories such as elementary and secondary education, higher education, informal education, e-education, and MUREP, to make funding issues clearer to the public. The FY2006 budget request is \$166.9M, and includes \$28.8M for Pathfinder Initiatives, \$28.5M for Elementary and Secondary Education, \$39.4M for Higher Education, and \$86.1M for the Minority University Research and Education Program (MUREP). Mr. Rajk discussed Dr. Jenkins' perception of a funding drop in education over two fiscal years, and pointed out that this perception could be accounted for by the imposition of Congressional earmarks. The budget has not in fact changed appreciably. Dr. Raizen pointed out that FY04-05 contained a considerable decrease in MUREP funds; these were also attributed to earmarks. Redefined Education outcomes were reviewed briefly. The Office of Education will measure progress in a number of ways: conduct Educator-Astronaut workshops, award 1500 competitive higher education scholarships, select 150 student experiments to participate in the Flights Projects program, and award 1100 competitive scholarships under MUREP. Dr. Loston interjected that the Science and Technology scholarships stipulate that the recipient work for NASA for 4 years. Dr. Raizen did not see how the impacts are measured in the program. Mr. Rajk agreed that more progress needed to be made in this area. Dr. Clay felt the Science and Technology scholarship work requirements were prohibitive to the accomplishments of the better students.

The program/project management process was graphically depicted in a life cycle chart. In response to a question, Mr. Rajk explained that NASA regards Education as a mission. Managing programs and projects involve formulation, approval, implementation and evaluation. Primary elements of management are scope, cost, schedule and quality. Other elements are communication, risk and acquisition/procurement (grants, partnerships, etc.). Control elements include methodologies, processes and reporting; program plan and Integrated Master Schedule; status reporting against established milestones and deliverables, data management and reporting, evaluation, performance management and measurement, and cost and relevancy to NASA.

Working Sessions I and II

Throughout the afternoon, the committee broke into groups to develop ideas in response to Dr. Canright's and Mr. Rajk's presentations.

Dinner Presentation

Dr. Buckingham introduced several guests from KSC, Mr. James Kennedy, Director of KSC, Hortense Burke, Executive Secretary to Mr. Kennedy, Lisa Malone, Head of External Relations at KSC, Ms. Ginger Davis, and Carl Stamer of Legislative Affairs (Detailed from NASA HQ). Mr. Kennedy extended a personal welcome to the committee.

Mr. Kennedy introduced the Brevard County Superintendent of Schools, Dr. Richard DiPatri, providing background information about the county's performance as compared to the state of Florida. The graduation rate in Brevard County was 88.4% (mid-60s in state) in 2003. The drop-out rate is 0.7%, the lowest in the entire state. In 10th grade science, the county ranks second in the state, and third in 10th grade mathematics. The county has 75,000 students, the 46th largest school district in the country. It is a high performing district. Ninety percent of the schools are A and B schools. Brevard students typically win 45-60 awards at science fairs. Other counties fare only half as well. The school district was birthed by KSC, where parents put a high emphasis on science and mathematics education. Every 6th grader in the school district visits KSC once per year. Next year, 7th graders will attend a Space Camp with simulations, and every 4th grader will visit the Indian River lagoon to take part in environmental science activities. Those experiences make the Brevard program stand out. KSC and the county are fighting the trend of teachers who fear the teaching of science, and is leading the country in hands-on science programs. Dr. DiPatri described a multi-county Florida program, Project Prism, working together to improve science and math and sharing results with the business community once per year. Dr. DiPatri credited NASA with providing the NASA Education Resource Center Workshops and professional development for hundreds of teachers. NASA provides student exposure to mission events, provides science fair judges, and is also involved in a new partnership with a Cambridge Massachusetts teacher exchange. Israel will join this partnership as well.

Dr. Loston thanked Dr. DiPatri for his presentation, and commented that his results are what NASA is all about. She thanked Mr. Kennedy and the KSC Team for participating in these positive educational outcomes. She cited the Harriett Jenkins fellowship as another vehicle for success.

Tuesday, April 26, 2005

Dr. Blanding made some administrative announcements, reminding committee members that SF-450 forms must be submitted annually for the purpose of complying with federal requirements related to conflicts of interest. An action was given to Kimberley Allen to send all members a notice of receipt of the SF-450 form.

Mr. Jim Stofan presented a series of teaser video spots, produced at Langley Research Center, that will appear in the Regal Cinema movie theaters the first week of May 2005, from Kids Science News Network. This campaign will coincide with the preparation for RTF. Pearson, which produces a Science Series for elementary schools, will utilize NASA content in their new Math textbook series, Smart Skies. Supplementary material for every chapter is being developed for all grade level performances (below, at, and above). Prentice-Hall will publish middle-school through university-level textbooks through the Space Act Agreement.

Discussion/Review of Working Sessions I and II

The results of the workshop discussions were reported. Recommendations were grouped into three time scales- today/tomorrow, 2025, and Beyond. Included in these categories were committee members' ideas for appropriate NASA activities in Education.

Dr. Raizen and Dr. Jenkins led the first discussion. Today, NASA should focus on learning to learn. These skills should include critical thinking, logical thinking, more rigor in K-16, and more depth and breadth. There should be an emphasis on finding a different way to engage students, and this may necessitate reorganizing the school year and school day by the year 2025. Small learning communities could be created, based on interest and facilitated by more virtual interaction, without losing socialization skills and teamwork. The ideal learning environment was described as exponential learning through experiential opportunity; learning through hands-on activities and engagement. Schools should balance the engagement/gee-whiz effect with fundamental learning in STEM disciplines. The overall story line is to prepare humans to become an interplanetary species. Beyond this, NASA should look to interplanetary species exploration; e.g., following the water on Mars. NASA should encourage young people to understand stewardship for the solar system, including the home planet. Dr. Raizen concluded with some observations- American education would become more market-driven, and Americans must learn to compete in a world-wide market. Other countries will build their own space industries (India, China). NASA should continue to form cooperative relationships with the entertainment industry; and encourage the industry to think about better content.

Mr. King led the second discussion. He felt that this moment in history would be regarded as the point when humans left the planet; the projected Mars shot is not too far in the future. Dr. Vasquez foresaw an economy separating into haves and have-nots, with knowledge and information made available only to the haves. The middle class/middle knowledge base is disappearing. NASA should keep in mind that the have-nots can't be left behind. Dr. Raizen remarked that all the computing power that went into the Apollo launches is minimal compared to what cell phone technology requires today. Schools must not be left behind in this respect, as well. Students should be able to know how to evaluate information in the presence of an overload of information. Distance learning would be valuable in this respect as well. Dr. Vasquez commented that many classrooms do not allow students to work in groups; teachers must learn management skills to help students learn to work together. NASA should explore this. Dr. Raizen added that there is

a discourse in science and engineering that must be modeled, and expressed a concern that kids are not handling real materials, real titrations, Bunsen burners, etc. They are losing the kinesthetic sense of the learning experience. Dr. Alston noted that the Explorer Schools are dealing with project management and problem-solving in groups. Mr. King asked: who is preparing the workforce for what happens next in NASA? There are people who are out of sync with the pace of change. What will we do with 70-year-olds who want a second career (when the human life-span reaches 120)? Mr. Jordan commented that public education is losing the battle; it has been the same since 1920, and now there is a great opportunity for change. The downside is that the lower class will have no access to education. Dr. Clay remarked that most people would say the schools are just fine, therefore the public needs to be informed of the seriousness of the math/science situation.

Ms. Ramsey's group opened the third discussion: what can Education provide that all the roadmaps need? The recommendations were to fill the pipeline and get the people and talent needed for NASA's goals. Engaging the public is essential- the public must see education as important, relevant and serious. Educators need to understand the flat-worlder's frame of reference and debunk myths. Engagement must be incentivized and rewarded. Education must be recognized as an economic imperative- if one is not technically literate, one is destined to be poor. Dr. Stiff discussed his daughter's perspective on math and science study (she is a scientist); for many of her generation, the payoff of science and mathematics education was not apparent. Popular culture offers no real motivation for math and science education. The current cultural emphasis is on glamour, sex, and wealth. It is not obvious to this culture that technical literacy is valuable. NASA has potential cultural heroes, and the Agency should explore how to make them resonate in popular culture. Dr. Clay suggested one avenue of public engagement such as that which occurred during the Apollo era, a mission that was fascinating to the public and that engendered increased interest in science education. The culture needs an equivalent change, in clarifying thought and in a prepared attitude for education. Dr. Loston cited the economic imperative; 15 of the top 20 jobs in the future will require math skills. Mr. King commented that what seems to be emerging is that Education needs better "PR". Dr. Raizen added that scientists and engineers want evidence of effective educational techniques- the Education Office must provide such evidence. Dr. Stiff agreed with Dr. Raizen, and suggested that scientists and engineers speak about their public school experience. Public schools give students access to students to materials they would not otherwise have. Public school in fact produces most scientists and engineers. Educators should be building up public schools and should not echo the pessimism of a classist nation. Public schools are very necessary in a democracy and should be encouraged to continue. Mr. Stofan mentioned that NASA has commissioned a study on why the Space Exploration Vision did not resonate with the public; there seem to be no good communicators, and NASA hasn't optimized communication opportunities. Dr. Clay agreed with Dr. Stiff. He did not sense a similar commitment that he had experienced as a public school student during the Apollo era. Dr. Jenkins asked: what do we want the ultimate student to be like? She assumed NASA would be pleased that he/she should be economically independent. She suggested concentrating on the product first, and then figuring out how to disseminate the

information. Dr. Raizen reiterated her advocacy of hands-on cognitive development techniques to support the hardware development required to go back to the Moon. This needs to be done at all levels of education. Educators must foster access to information, such that all children have choices. Not everyone will become a scientist.

A Vision to Inspire a Plan for Change

Dr. Alston provided an overview of the Office of Education policy development as it transitions. The Office of Education is looking for a consistent NASA look and feel, and adherence to Agency policies, guidelines and processes for the production and delivery of education products. Accessibility of materials online via the Education Portal must be assured, and materials must be 508-compliant. Education presents its projects to the Operations Council, an executive advisory body headed by the Deputy Administrator. Other areas of accessibility include title IX compliance. Education has been asked to look at policies in place regarding Title IX. There is untapped potential in women for science, math and engineering. NASA should use its policies to help improve compliance, and may in fact want to be the lead federal agency for bringing women into science, through research grants and the Graduate Student Research Program (GSRP).

The “One NASA” approach ensures close and effective collaboration with Mission Directorates and the Education Offices of the NASA field centers. The Office also seeks to strengthen the link between performance and budget, identify performance measures that address outcomes and improve the program evaluation, assessment and approval process. An Education Program Management Council (EPMC) has been established, comprised of an internal group of NASA senior technical and education managers, to improve projects through open competition and rigorous peer review. The Office will consider projects that include control groups for better outcome assessment. The Office will conduct rigorous program/project management in alignment with NASA goals and objectives, and conduct periodic program reviews and ongoing evaluation of Education projects using Education Program operating principles. The operating principles were briefly reviewed. (*The Operating Principles are: Customer Focus, Content, Pipeline, Diversity, Evaluation, Partnership/Sustainability – Leverage, Quality and Feasibility, and Resource Utilization*). Dr. Alston invited the EAC to provide input for the process of policy development. Mr. King asked if the EAC should set the standard, and Dr. Alston replied in the affirmative. Dr. Loston requested a summary from the EAC, containing recommendations for policy guidance and direction.

Discussion/Closing Remarks

Dr. Raizen recommended clarifying language in terms of output, outcome, and efficiency. Mr. Rajk indicated that it is a work in progress. Mr. King agreed that program evaluation is important. Dr. Clay commented that the look and feel of the concept is unclear, and while the NASA look or “brand” is important, there should be an indication that education is the theme. Mr. King noted that NASA already has a cachet in education and should build, develop and extend recognition of this image. Dr. Loston commented that there has been much discussion on branding and that NASA is trying to corral independent efforts in this regard. Dr. Canright agreed that decentralization has diluted the NASA message, and recognized the importance of having some common graphical

standards, but tailored to various offices. The first effort to attain consistency can be seen in the design of the NASA home page, and it is an ongoing effort with products. Dr. Loston offered another example of the NASA banner in the presentation material. Ms. Ramsey stressed that it was important to establish a message architecture, and offer visual triggers to get access to information quickly. Dr. Buckingham mentioned that KSC now uses the NASA logo instead of the KSC logo. Dr. Clay commented that the Regal Cinema video clips did not necessarily seem to present a single message. As other agencies are seeking the same outcome of attracting students to science, perhaps NASA should pool resources with these agencies to accomplish a common goal. Dr. Raizen suggested NASA find role models to present the message (e.g., Bill Nye the Science Guy). Mr. King agreed that NASA has an opportunity to create heroes and get into the PR business, to create the next Carl Sagan. Mr. Jordan commented that educators must convey the idea that *smart is cool*. Dr. Rose Tseng noted that the National Science Foundation (NSF) has much messaging directed toward improving minority representation in science, and offered Sesame Street as an example for global distribution of messages. Mr. King suggested IMAX as another vehicle, and zero gravity experiences for young people. Dr. Clay recommended the Weekly Reader and Reader's Digest as another vehicle for required reading.

The EAC generally endorsed Dr. Alston's summary, and suggested adding a statement about NASA providing experiential learning, pulling in some specifics gleaned from working sessions. Dr. Raizen felt that NASA should take advantage of platforms that already exist in virtual learning opportunities. Mr. King suggested the EAC provide guidance on tactical directions. What will the learning environment look like, what are the tools needed? He wanted to hear how NASA is improving critical thinking, for example. There was general agreement with this statement. Dr. Jenkins agreed it was important to put some meat on the bones of advice. Mr. King suggested emphasizing the economic imperative, and recommended that the committee draft a quick summary of recommendations, and have the Office respond at the next meeting. Dr. Jenkins suggested NASA increase its interrelationships with other federal agencies and the entertainment industry. Dr. Vasquez felt it was important to engage the total teaching force; something must resonate with the teachers. The teachers must recognize and validate the importance of NASA; enlist teachers to be the salespeople for NASA. Dr. Tseng encouraged the Office to engage the media, and parents. Dr. Vasquez recommended finding figures with the stature of Stephen Spielberg and Donald Trump, and incorporating lessons learned from entertainment and gaming to target the audience. Dr. Raizen re-emphasized defining impact outcomes and measuring them as an ongoing process that must be built into a strategic plan. Mr. King asked the EAC to consider the discussion and add to the list for the Education Office to consider. Ms. Ramsey observed that all of the recommendations seem to funnel back to engaging the public in elevating science and education. Dr. Jenkins stressed adding the impact evaluation, continuing to talk about it and define it.

NASA's Office of Education will consider two options for the next meeting location, Glenn Research Center (GRC) in Cleveland, OH, to continue acquainting EAC Members with the research and education programs at the Centers, and Washington, DC to

facilitate a meeting with the NASA Administrator. The meeting notice will be posted on the NASA Education Web Site at www.education.nasa.gov, and in the Federal Register.

Mr. King distributed a certificate commemorating Space Ship One flights for each committee member. The meeting was adjourned.

Appendix A Attendees

Committee Members

Douglas King/St. Louis Science Center- Chairman
William B. Harvey/American Council of Education
Harriett L. Jenkins/Consultant
Rose Tseng/University of Hawaii at Hilo
Senta Raizen/National Center for Improving Science Education
John Jordan/Mississippi Department of Education
Philip Clay/MIT
Carol Ramsey/Raytheon
Lee Stiff/North Carolina State University
JoAnne Vasquez/Author
Katie Blanding/*NASA Headquarters-Executive Director*

NASA Attendees

Adena Williams Loston/*NASA Headquarters, Chief, Office of Education*
Bernice Alston/NASA Headquarters
Gregg Buckingham/NASA Kennedy Space Center
Carolyn Knowles/NASA Headquarters
Shelley Canright/NASA Headquarters
Martin Rajk/NASA Headquarters
Kimberley Allen/NASA Headquarters
Larry Bilbrough/NASA Headquarters
Sandy Brubaker/NASA Headquarters/OLA
Renee Juhans/NASA Headquarters
Erika G. Vick/NASA Headquarters
Jim Stofan/NASA Headquarters
Jim Hattaway/NASA Headquarters

Other Attendees

Evan McCollum/Lockheed Martin
Joan Zimmermann/Consultant, Infonetic
Mary Floyd/Infonetic

Appendix B

Presentations

1. *Kennedy Space Center Overview*; Dr. Woodrow Whitlow Jr.
2. *KSC Education Programs and University Research Division*; Gregg Buckingham
3. *NASA Strategic Roadmaps*; Shelley Canright
4. *Managing Education Programs and Projects*; Martin J. Rajk
5. *A Vision to Inspire a Plan for Change*; Dr. Bernice Alston

Other Materials

Kennedy Space Center brochure

4:15-6:00 PM

KSC Tour

6:00-6:45 PM

Refresh/Travel to Dinner Meeting-
At Hotel

7:00-9:00 PM

Partnerships that Support NASA's
Education Programs, Superintendent
of Brevard County Schools

Tuesday, April 26, 2005

7:00-8:40 AM

Breakfast

8:40-8:45 AM

Call to Order

10:00-11:00 AM

Review of Sessions

11:00 AM-12:30 PM

Lunch
Closing Comments
Date and Location of Next EAC
Meeting
Adjournment

Appendix D

Membership

Mr. Douglas R. King (Chair)

President and CEO
St. Louis Science Center
5050 Oakland Avenue
St. Louis, MO 63110
TEL: (314) 289-4474
FAX: (314) 289-4460
Email: dking@slsc.org
Assistant: Sue Huber, shuber@slsc.org
314-289-4494

Dr. Dolores M. Fernández

President
Eugenio María de Hostos Community
College of The City of New York
500 Grand Concourse
Bronx, NY 10451
TEL: (718) 518-4444
FAX: (718) 518-4157
Email: dfernandez@hostos.cuny.edu
Assistant: Jewel Clark, 718-518-4295
jclark@hostos.cuny.edu

Mr. Wayne C. Johnson

Executive Director
University Relations Worldwide
Hewlett-Packard Company
1501 Page Mill Road, MS 3L-7
Palo Alto, CA 94304
TEL: (650) 857-4257
FAX: (650) 857-8100
Email: wayne.johnson@hp.com
Assistant: Chris Fritz, chris.fritz@hp.com

Dr. Jo Anne Vasquez

Science Education Consultant
1517 West Antiqua Drive
Gilbert, AZ 85233
TEL: (480) 926-8103
FAX: (480) 545-5012
CELL: (602) 818-3739
Email: Joanne_Vasquez@mcgraw-hill.com

Dr. Phillip Clay

Chancellor
Massachusetts Institute of Technology
Office of the Chancellor, Room 10-200
77 Massachusetts Avenue
Cambridge, MA 02139
TEL: (617) 253-6164
FAX: (617) 258-6261
Email: plclay@mit.edu
Assistant: Alex O'Neil, alexnow@mit.edu
(617) 253-1916

Dr. Harriett G. Jenkins

Consultant
8046 Park Overlook Drive
Bethesda, MD 20817
TEL: (301) 365-1456
FAX: (301) 365-1496
Email: HarriettGJ@aol.com

Dr. John Jordan

Deputy State Superintendent
Mississippi Department of Education
Central High School
359 North West Street
Jackson, MS 39205
TEL: (601) 359-3514
FAX: (601) 359-2566
Email: jjordan@mde.k12.ms.us
Assistant: Ms. Bonnie Pitts

Dr. Marie V. McDemmond

President
Norfolk State University
Office of the President
700 Park Avenue
Norfolk, VA 23504
TEL: (757) 823-8670
FAX: (757) 823-2342
Email: mcdemmon@nsu.edu
Assistant: Jacqueline Curtis, jacurtis@nsu.edu

Dr. Gerald “Carty” Monette
President
Turtle Mountain Community College
Bia No. 7 North
Belcourt, ND 58316
TEL: (701) 477-7862, ext. 2050
FAX: (701) 477-7870
Email: cartym@tm.edu or cartym@aol.com
Assistant: Judy Belgarde, ext. 2056,
jbelgard@tm.edu

Ms. Senta Raizen
Director
National Center for Improving Science
Education/WestEd
1840 Wilson Blvd, Ste. 400
Arlington, VA 22201
TEL: (703) 875-0496
FAX: (703) 875-0479
Email: sraizen@wested.org
Assistant:

Dr. Lee Stiff
Past President of the National Council
of Teachers of Mathematics (NCTM)
Professor of Mathematics Education
North Carolina State University
326-D Poe Hall, Box 7801
Raleigh, NC 27695-7801
TEL: (919) 515-6909
FAX: (919) 676-3474
Email: lee_stiff@ncsu.edu

Executive Director
Dr. Katie Blanding
NASA Headquarters
Office of Education
300 E Street SW
Washington, DC 20546-0001
TEL: (202) 358-0402
FAX: (202) 358-0122
Email: Katie.blanding@nasa.gov

Dr. Diana S. Natalicio
President
University of Texas- El Paso
President’s Office
Administration Building, Room 500
El Paso, TX 79902
TEL: (915) 747-5555
FAX: (915) 747-5069
Email: dnatalicio@utep.edu
Assistant: Martha Carrasco
mycarrasco@utep.edu

Ms. Carol Ramsey
Director, Corporate Contributions
Raytheon Company
1920 Nelson Avenue, Unit A
Redondo Beach, CA 90278
TEL: (310) 847-6410
FAX: (310) 513-5725
Email: cjramsey@raytheon.com
Alternate Contact Information
870 Winter Street
Waltham, MA 02451
TEL: (781) 522-5114
FAX: (781) 522-6416

Dr. Rose Tseng
Chancellor
University of Hawaii at Hilo
200 W. Kawili St.
Hilo, HI 96720-4091
TEL: (808) 974-7444
FAX: (808) 974-7622
Email: rtseng@hawaii.edu
Assistant: Marcia Heller, hellerm@hawaii.edu

Administrative Officer
Kimberly Allen
NASA Headquarters
Office of Education
300 E Street SW
Washington, DC 20546-0001
TEL: (202) 358-1436
FAX: (202) 358-7097
Email: kimberley.allen@nasa.gov