

National Aeronautics and Space Administration  
Office of Education

## Education Advisory Committee Meeting

June 24-25, 2004  
Johnson Space Center  
Houston, TX

MEETING REPORT



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Dr. William B. Harvey  
Chair, Education Advisory Committee



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Dr. Katie Blanding  
Executive Director

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*Thursday, June 24, 2004*

### **Welcome and Introductions**

The second meeting of the Education Advisory Committee (EAC) was held June 24-25, 2004, and was hosted by the Johnson Space Center (JSC), Houston, Texas, with the JSC Office of Education as the Lead. The meeting opened with a welcome and introductions by the Chairman, Dr. William Harvey. All sessions were held at the Hilton NASSAU Bay Hotel. Introductions were made around the table. Committee Members made brief remarks about their background. Dr. Harvey offered general remarks on the profound need to introduce and maintain science education from early in the education experience throughout the entire process, ending in career placement. He noted that NASA must recognize the multicultural and ethnic diversity of the changing U.S. demographic landscape, and the concomitant need to engage students appropriately.

### **The Impact of the Educator Astronaut Program on Elementary and Secondary Education**

Dr. Adena Williams Loston, NASA Associate Administrator for Education, introduced the guest speaker, Educator Astronaut, Ms. Barbara Morgan, the “NASA mascot for education.” Ms. Morgan has been with the Agency for almost two decades, and served as the first Educator Astronaut as part of the Pathfinder Initiative. An inspirational leader to the students, she will be the first Educator Astronaut to fly in space, but she remains a third grade teacher. She is a graduate of Stanford, and has taught for 24 years.

Ms. Morgan thanked the EAC for its service to NASA and pointed out that the President’s Vision for Space Exploration has brought about a radical change in education. The impact on the NASA Education mission will be profound. Classroom teachers represent a cultural and institutional change for NASA. Pete Aldridge has emphasized the importance of reaching one teacher, and therefore reaching many more students, a valuable multiplier effect. Nowadays, with the emphasis on education standards and testing, teachers need inspiration to help energize their students. The first educator conference has been held for the first class of Educator Astronauts, who envision an opportunity to perform selfless national service. There is also a multiplier effect of teachers on other teachers; they will give NASA great guidance and real world advice. Because they are bringing teachers into the mission, Educator Astronauts will bring the education context to NASA. The responsibility for students is paramount to the Educator Astronaut experience.

Dr. Harvey asked Ms. Morgan to respond to questions on how NASA can close the achievement gap, and how NASA can bring the K-12 population to the hiring community. Ms. Morgan replied that more teacher education is the key. She gave enormous credit to Dr. Harriett Jenkins for encouraging women, minorities, and the disabled in the Agency, and for recognizing many aspects of the pipeline concept. Ms. Morgan observed that NASA can always do more in this area. NASA was the first Federal agency that successfully countered a negative time in the U.S. for education by

initiating the Teacher-in-Space Program. NASA is now performing the same service for education by placing people, resources, money, opportunity, and helping to level the field.

Dr. Doug King related a similar experience with the Teacher-in-Space Program. He noted the presence of many self-identified educators at the local level who can help by reaching the heart of a large network of educators. All of the applicants to the Educator Astronaut Program had outstanding resumés; some were simply not physically qualified or were too inexperienced to participate in the Educator Astronaut Program. Dr. Loston said that NASA is still committed to the educators in terms of the four tiers of the selection cohort, and is looking for different ways to engage all the applicants. For example, Tier Four will work with the Centers. Tiers Two and Three have attended launches and will return to their communities to champion the cause of the education pipeline. Ms. Morgan recommended giving all the cohorts the same experience. Dr. King recommended inviting all applicants to special meetings. Ms. Morgan agreed that anyone and everyone who desired to participate should be allowed to do so. Dr. Marie McDemmond's pre-service teacher population (55 institutions) could benefit from interaction with Educator Astronauts. This would provide excitement in teaching math and science, and funding could be drummed up to make this happen. Partnering with higher education institutions would also be helpful. Ms. Morgan added that the participation of science museums and professional organizations is needed to achieve a critical mass. Ms. Senta Raizen remarked that NASA needed a strategic plan to engage the teacher community effectively. Dr. Loston replied that a strategic plan was shared with the teachers at the recent conference. The Pre-Service Teacher Program has been growing, but the Agency is still working to pull together NASA's 17 disparate parts. Dr. Harvey commented that NASA could help maximize the effort by coordinating a synchronized strategic interface with the education community. Mr. Johnson commented that the educators are exemplars for how science should and could be taught; it is creativity and invention, and not testing, that is needed in education. NASA can be at the forefront of a national dialogue on why education is not working, and where it should be going. He noted that education is funded at state and local levels, and recommended Barbara Morgan as a voice for the dialogue. Ms. Morgan commented that teachers have said that NASA can help them obtain freedom in their classrooms. She felt that NASA's gift to the teachers was a voice. Dr. Diana Natalicio noted that it is very important that there should be planning and orchestration, but there are also small things that can be done. First, get a sense of geographic distribution of these educators, and capitalize on their presence in a region. Second, an important place for teachers' voices to be heard is in the state legislatures. NASA's credibility and cachet can enhance the effectiveness of Educator Astronaut spokespersons; they should testify in legislative sessions. It's where so much that is tying teachers in knots is originating. Inspiring teachers is one of the best ways to accomplish change in this area. Dr. Rose Tseng agreed that it would be helpful to know where the educators are; they could be useful when educational institutions apply for grants, etc. Dr. King commented that NASA, at the very least, could introduce the Educator Astronauts to the community. Dr. Jenkins suggested that NASA was in a prime position to role-model the diversity of teaching styles, and to develop multiple teaching models to stress that one size of education does not fit all. A video of the first three members of the

latest Educator-Astronaut class was shown, detailing how these teachers became involved in education.

### **Dialogue on NASA's Office of Education in the Transformed Organizational Structure**

Earlier in the day, NASA's Administrator, Mr. Sean O'Keefe presented an Agency Update, detailing NASA's formal response to the findings and recommendations of the Aldridge Commission. While on the campus of JSC, the EAC Committee had the opportunity to attend the televised presentation of the Administrator's Update. During this talk, the Administrator noted that the Office of Education is an important vehicle for revivifying and communicating the importance of science and mathematics instruction. Without a capable and science-literate student body in the US, it will be nearly impossible to carry out the ambitious space program as currently envisioned. NASA, therefore, is in a viable position to greatly influence the philosophy and practical approach to education.

### **The Role of the NASA Education Enterprise in the Vision for Space Exploration**

Dr. Loston presented background information on the Administrator's Update regarding the transition to a new operational structure, reminding the EAC that the new vision is the first strategic vision since that given by JFK in 1960. The President's January 14, 2004 vision speech was replayed on videotape. She explained the intention of the Aldridge Commission, and subsequent changes to the NASA organizational chart. The Commission's findings and recommendations were reviewed and discussed. The four new business lines are Science, Exploration Systems, Aeronautics Research and Space Operations. Aligning the educational representatives with the new business lines is now necessary to reflect the new organization. Dr. Loston introduced the various Headquarters Science and Technology (S&T) Enterprise Program Leads who were attending the meeting. A new organizational chart was distributed. The business lines are now known as Missions, not Enterprises. Two new offices that are cross cutting across the agency are the Office of Safety and Mission Assurance (Chief- Bryan O'Connor), and the Office of Education (Chief- Adena Williams Loston). The role of the EAC continues, in line with the transformation. Education remains a pervasive thread running through all the departments. Dr. Jenkins asked if the mission support people, institutions and management staff, or Chief of Strategic Communications, would have responsibility for education. Dr. Loston replied that the Office of Education would continue to work closely with them.

Dr. McDemmond noted that there had been a suggestion that the NASA Centers become independent business enterprises- is this a possibility? Dr. Loston replied that further input would be sought on how the Centers will be structured. Privatization is just one possible model. There is far more work to be done before such a transformation can take place. Mr. Johnson commented that a more federated private-public model may be much more successful, and a Burt Rutan-like individual would be highly valuable in this area. There are many opportunities for NASA to lead the way in developing such a model.

Dr. Loston mentioned that NASA may get out of the business of low-Earth orbit (LEO) missions and concentrate on human space flights. NASA must form a projects team for each enabling technology, and may look to Requests for Information (RFIs), and listening to the public, science communities, and other agencies to accomplish this objective. The last Leadership Retreat reviewed four Pathfinder Initiatives; a fifth integrated initiative could be pulled together in tandem with the four business lines. Sustaining long-term exploration requires a robust space industry that will become a national treasure. RFIs are also the answer here. International talents and technologies will be of significant value in successfully implementing the space exploration vision, tapping into the global marketplace. To enable scientific knowledge, the NASA response is to seek RFIs as well, to routinely engage the scientific communities.

Finding (8) of the Aldridge Report, in particular, focuses on the extraordinary opportunity to stimulate mathematics, science, and engineering excellence for America's students and teachers, and to engage the public. Recommendation (8-1) specifically calls for increased priority on teacher training, provision for better integration of existing math, science and engineering education initiatives across governments, industries, and professional organizations, and exploration of the Virtual Space Academy for training the next generation workforce. Dr. Loston felt it would be necessary to clarify the role of NASA in education vs. the role of the federal Department of Education. Dr. Harvey felt the EAC should reflect on the implications of the findings. Dr. Jenkins thought the current NASA Advisory Council (NAC) might also have similar concerns in response to the Aldridge findings concerning space operations. Dr. King referred to Recommendation 2.1 and the language surrounding "Direct Reporting to the President" and predicted a debate on whether Education is a national priority. Dr. Jenkins asked Dr. Jeffrey Rosendhal about the existence of a space exploration committee. Dr. Rosendhal replied that it has appeared and disappeared over the years. It was recreated under the first President Bush and chaired by Vice President Dan Quayle. It disappeared in the Clinton Administration, but Mr. Aldridge felt it needed a resurrection. Dr. Loston explained that there is a fear that such a committee would become a parking lot for difficult or dead issues. Dr. Loston also pointed out that Recommendation (8-1) solicits RFIs to examine what is already in place, and to change or expand existing constructs. For example, NASA will partner with Excellence in Science, Technology, and Mathematics Education (ESTME), a new initiative designed to involve high school students in science and engineering. Recommendation (8-2) focuses on creating an internal and external messaging package.

NASA transformation talking points, press release, and notes on the morning briefing were distributed.

Dr. Harvey felt the transformed NASA structure was of particular interest, especially in regards to how the EAC might be affected by the newly elevated position of Education in the NASA organization. He questioned whether the EAC should formally inquire about the effect of the change? Dr. Jenkins felt that she must read more of these documents first, and thought she had heard the Administrator say that the recommendations do not necessarily have to be accepted in the form and format in which they were presented.

Dr. Natalicio commented that there were two signals that seemed worrisome. Education is not on the Strategic Planning Council (SPC), and the reporting lines seem to block Education's direct access to the missions. Mr. Johnson commented that "incomprehensible" is the word that comes to mind. Dr. King felt it would be appropriate that the EAC formally raise concerns on implementation. Dr. Loston reminded the Committee that these activities were occurring in real time and the details were yet to be worked out. Mr. Jordan commented that the organization chart was uncontrollable and unimaginable, with too many people vying for the attention of the Administrator. Mr. Johnson runs a horizontal organization and felt they are difficult to make happen, and suggested asking NASA what it was going to do to allow that horizontal movement and make it work. Dr. Jenkins suggested commenting on the absence of the Safety Chief on the SPC. Dr. Jordan commented that it looks like the Deputy Administrator (DA) is the implementer, and the Administrator is just the politician. Dr. Loston averred that the DA is still the functional driver for daily operations, as the leader of a matrix management model. Dr. Jenkins commented that the organizational structure appeared too difficult.

### **Recommendations from the Previous Meeting**

Dr. Harvey called attention to recommendations from the EAC's previous meeting and asked members to give thought to how the former Education Enterprise ran education activities. The Office of Education still needs an understanding between products and activities; budgets and resources still need to be fleshed out, and the role of Education in supporting the new vision needs to be elucidated.

Mr. Johnson asked for evidence of NASA's collaboration in aligning resources with and leveraging commodities of other federal agencies driving the education platform. Dr. Harvey felt that NASA should make this evidence more explicit, especially if NASA is moving to a more corporate apparatus. Ms. Raizen did not see the higher level of accountability in the response. Dr. Harvey asked Dr. Loston for guidance on how to help Education, and added that there was a lot of enthusiasm at the NAC for the transformation. He felt a sense of cogency and direction that had not existed before. At the next NAC, the EAC would like to give input on translation and direction for the CEO in this new structure. Dr. McDemmond stated that if Education is organization-wide, it needs to be reflected in a more integrated and accountable approach throughout NASA; consequently, the EAC should focus on broader or additional recommendations for the next meeting.

Dr. Harvey felt that NASA's unique role in encouraging the next generation of explorers is only implicitly referred to in the new report, and that the EAC must respond to this. A very comprehensive strategic approach to interfacing with the K-12 community should be sketched out as soon as possible. This is a very challenging and significant opportunity. Dr. Houston observed that there might be more of an emphasis on the biological sciences as they become a stronger need for the Agency, as well as the psychosocial impact of long-term isolation and long-duration space flight. K-12 considerations will remain the same. Dr. Loston agreed that the major aspects will not change. Education recognizes that it still needs the pipeline, and will continue to partner with the National Science

Foundation (NSF), the Department of Education, solicit parental engagement, and pursue sustainability, connectivity with NASA Explorer Schools, community involvement, focus on minority education, and increase support to minority institutions. Metrics are still under discussion. Dr. Houston mentioned that NASA is still establishing baseline data beginning from fiscal year 2004. Dr. Harvey commented that one cannot assume that Dr. Loston now has the budget and resources to carry out the Commission's recommendations. Dr. Loston commented that the budget is very decentralized— each Enterprise retains its own education dollars and governs educational activities in a mission-specific way. Education takes the mission content and transforms it into educational products. Mr. Johnson suggested that someone needs to sit on top of the issue to determine the best educational outcome.

Dr. Loston explained that Level Zero requirements for Education have been established, and Level One requirements will discuss more specifics, such as the budgetary and resource allocations, performance, etc. to carry out the Vision of Space Exploration. The Clarity Team's white paper will also address more particulars on how the organization functions in the concurrence model. Education centers are responsible if integration or accountability fails. Dr. Houston noted that within the last year, NASA has been trying to bring these independent entities together- it's not perfect, but the effort is driving toward a common database. Ms. Raizen felt that the organization would still need clear lines of authority. Dr. Jenkins commented that while the new organizational structure appears to take away the power, Education must ensure that it has the power to carry out its stated strategy- it needs to be charged to a Center Director or Associate Administrator to ensure accountability- what happens if the goal is not met? Further discussion on budgets and accountability were promised for the following day.

### **S&T Enterprise Education Program Updates**

Dr. Loston used the opportunity to comment on the effectiveness of the activity's impact on Education, therefore the Education leads have been invited to speak.

### ***NASA Earth Science Enterprise***

Dr. Ming-Ying Wei presented an update on Earth Science educational activities. NASA's challenge is to understand and protect our home planet. In addition to the 17 satellites now in operation, AURA will study atmospheric chemistry (launch date is July 8<sup>th</sup>). Knowledge, tools and facilities, and people combine to provide value and benefits to society. Earth Science relies on information technology (IT), and it is a challenge to link people to the information at appropriate educational levels. Funding levels associated with the various programs were presented. The measure of effectiveness is determined by competitive selection, descriptive statistics, and value as reflected by aspects that are systemic, sustainable and scalable. There is no common format as yet for statistics, as the division is awaiting an APG on metrics.

Examples of Earth System Science Education for the 21<sup>st</sup> Century (ESSE 21) were presented, including promoting systemic change in undergraduate education- the courses have been popular and are still being taught. Other programs listed were the Earth System

Science Education Alliance (ESSEA), and Students' Cloud Observations On-line (S'COOL), a worldwide program. The GLOBE program is a leader in sustainable international partnerships. Minorities Striving and Pursuing Higher Degrees of Success is a mentoring program at the undergraduate level and is being conducted in partnership with NSF. The Research, Education and Applications Solutions Network delivers Earth Science resources through e-Education. A major goal is to produce descriptive statistics on science. Another goal is to share best/better practices and building synergy in day-to-day operation. A \$5M joint solicitation is upcoming for integrated solutions in K-12 and Informal Education. Accountability will be difficult. Dr. McDemmond encouraged better attention to program planning and performance assessment in order to earn a Green on the OMB scorecard. Dr. Wei replied that the programs recently selected were those deemed most likely to meet needs; a roadmap activity is also under way to guide implementation of planning. The effect of participation on the students, in some programs, is measured by evaluation (student engagement and thinking skills). The original measure is the quality of the data. In response to a question, Dr. Wei noted that the report speaks to APGs in the program plans. The new solicitation includes valuation criteria. Dr. Jenkins asked if the number of teachers trained over time has increased in the GLOBE Program. The answer was, generally, yes. Dr. Jenkins asked how one might determine that the program is increasing in quality. Ms. Raizen stated that numbers alone are not convincing outcomes—one wants the result in terms of student learning or persistence. Dr. Wei noted that the NSF metrics are very different from Education's. Dr. Jenkins asked if any changes had been forced by the Aldridge report. Dr. Wei replied that the allocation is about the same, although the integration is changing. Dr. Natalicio commented that a lot of these programs miss the mark on evaluation and outcomes; they repeat the same mistakes over and over. How do we scale up evaluation in terms of sharing best practices, and avoid re-invention of the wheel? Proposers must have guidance.

### ***NASA Office of Space Science (OSS)***

Dr. Philip Sakimoto represented the Space Science Enterprise activities. He began with an update on the Cassini-Huygens mission to Saturn and its moon, Titan. Mission solicitations require an embedded Education-Public Outreach (E/PO) program, and every space science mission has a built-in Education-Public Outreach component/. One facet of the mission is a literacy component. Pre and post-test results were presented on the effect of a literacy unit on a second grader, showing great improvement. The proposal process was illustrated, showing how education functions as a tiebreaker in proposal selection. There are also E/PO supplements offered as part of research grants, engaging scientists all across the country in education. The E/PO support network provides coherence to the great variety of information that results from the research. A graphic was presented, detailing how monies are allocated for Space Science, resulting in about \$40M (about 1% of total space science budget) without being a line item in the budget. The division contributes \$1M to NASA graduate and post-doctoral fellowships. The extent of the Office of Space Science (OSS) E/PO activities was detailed, showing that there are 460 new activities and 20 new products, more than 5000 discrete E/PO events, with presence in all 50 states. Evaluation is achieved through individual project evaluations, product

review, the Lesley University PERG, and an E/PO task force. The Space Science Advisory Committee (SScAC) E/PO task force report states that the NASA Space Science E/PO program has made remarkable progress. Improvements will be to make educational products more accessible, expand efforts to attract minorities, improve quality control and understanding of program impact, and strengthen professional development opportunities, etc. The PERG evaluation is divided into three phases-the third report focuses on the impact on six major audiences, defines impact for each audience, and provides qualitative data. Definitions of impact vary with the target. Attributes of resources with impact in the classroom were presented and sample findings shown. Phase III summary conclusions were presented. PERG's next steps are to address professional development, collect quantitative data, and perform longitudinal studies. Dr. Jenkins suggested that in addition to evaluating teachers, a creative way should be developed to find out what makes the learner learn. Ms. Raizen remarked that there is a logic chain that says if you do something for a teacher, it does something for a student, but it is a complex issue.

### ***Biological and Physical Research Enterprise (BPRE) Education Program***

Ms. Bonnie McClain presented an overview of BPRE education, and in assessing the difficulty of judging the impact of a product or program on learning, made the analogy of tying a dentist's salary to a patient's compliance with flossing. The key question is to measure the practical parameters. Evaluation of program and products is centered around quantitative and qualitative measures of success, formative, summative, and anecdotal data. Future plans include more evaluation. BPRE fundamentally provides products, but it has three programs funded at \$100K or higher. Quantitative measures of success include the number of participants in programs; event attendees; the potential broadcast audience; product units distributed at conferences; downloads; number of workshops; unique and repeat website visitors; time spent on websites, and page views, etc. Qualitative measures are the recognition of established and accepted policies in terms of content and editing reviews; civil service approval of science output; adherence to relevant principles; adoption of best practices; external awards and recognition, and internal measures such as credentials of the education outreach community, and acceptance and involvement of the research community. In addition, many scientists and researchers from well-recognized academic institutions are working with the BPRE. Formative evaluation includes internal reviews, internal assessments (adherence to education "exemplary criteria" and identification of best practices), and use of external consultants and testing (field testing, strategic planning). Summative evaluation includes product popularity (customer satisfaction surveys, monitoring demand for updates and other versions), independent evaluation, financial (final costs and return on investment) and internal (partnerships and leveraging opportunities) assessments. Future steps are to establish a balanced scorecard, implement more rigorous reviews, seek expert guidance (task force, advisory boards, etc.) and to establish a community award (Golden Garfield).

### ***Office of Aeronautics/Office of Exploration Systems***

Mr. William Anderson presented an update on the efforts of the two offices. He has been trying to put together an education plan for the new Office of Exploration Systems. When this is done, it will be used as a template for a new plan for Aeronautics. There are three development programs- human and robotic technology, exploration transportation systems and nuclear systems development. Centennial Challenges is a program that challenges the U.S. to help the exploration transportation systems to meet goals. This is the first opportunity to develop an Enterprise Education Plan based on the Education Enterprise Strategy. The elements of the new plan will support the goals of the vision, and will entail the development of a new committee, the Exploration Systems Education Coordinating Committee (ESECC), consisting of representatives of the Office of Exploration Systems (OES), Education, and appropriate outside experts. The Education development programs should receive 1% of the total OES budget. The plan for Aeronautics is being revised, and can potentially increase the amount of support that comes out of Aeronautics for Education. There will be an Aeronautics Education Coordinating Committee (AECC), consisting of representatives from Aeronautics, Education, and appropriate outside experts. All evaluation metrics will be reported through the NASA Education Evaluation and Information System (NEEIS). Nonstandard metrics collection are now in place, however NASA needs to have standard evaluation requirements for all Education programs based on reputable models, and all Education programs will incorporate an evaluation plan when it is presented. The allocation levels are generous and based on past NASA practice. The Aeronautics Education budget was \$2M last year. Ms. Raizen commented that with overall investments at \$1.3B, it doesn't seem to be adding up. Dr. Houston commented that a lot of the dollars go to graduate students. A breakdown of the budget was promised for the next day.

### ***Office of Space Flight***

Ms. Debbie Biggs presented an update on the Education activities in the Office of Space Flight (OSF). The budget is \$5.1M, and the funds are disbursed mainly to the four space flight centers (Kennedy, Johnson, Marshall and Stennis). Funds are also disbursed to Langley for program specific activities (pre-service teachers). Impact is measured through the NEEIS. All OSF centers will gather data. S&T content will be emphasized by aligning research-related activities with center strategic goals and objectives, and educator workshops will focus on center-defined technology development initiatives. Considerations are to determine NASA's prescription for supporting education activities, emphasizing S&T content, and applying metrics and measuring program impact, developing how-to models that meet criteria standards, and replicating these activities NASA-wide. Furthermore, it will be ensured that OSF-sponsored programs will align with the goals and principles established by the Office of Education. All products will go through the Office of Education review process.

Friday, June 25, 2004

The second day of the EAC Meeting convened on June 25, 2004 at the Hilton NASSAU Bay Hotel in Houston, Texas. Dr. Harvey opened the session, and announced that the expectation of the EAC is to meet three times per year; and, the third meeting is scheduled for October 25-26, 2004. The October EAC Meeting will be hosted by the Jet Propulsion Laboratory (JPL), in Pasadena, California. A day will be added for tours and briefings of Education Programs and Research Laboratories at JPL.

### ***The Role of the EAC in the Transformed Structure of NASA***

Dr. McDemmond recommended that the Committee examine how recommendations may change and expand; the final accounting should be provided to the NASA Advisory Council (NAC), the DA and the Administrator. The new organization is nearly lateral and this will have implications for the budget. Dr. King mentioned matrix management in the context of program managers vs. career managers and thought it might be interesting to see how this might work for the career development and education of a young engineer. One can learn from companies that do this regularly. Hewlett-Packard is known for doing this, as is the Rand Corporation.

Mr. Johnson requested clarification regarding the inclusion of minorities, women, and HBCUs in the strategic plan, and in the budget discussion. He also recommended that NASA's entire investment in higher education should be within the purview of the EAC. In response, Dr. Loston referred Mr. Johnson to the strategic planning document (Education Enterprise Strategy- Strategy 6, page 20), which outlines the agency-wide strategy for incorporating diversity. Dr. Sakimoto and Dr. Clifford Houston (Deputy Associate Administrator for Education Programs) described other active programs.

The NASA Partnership Awards for the Integration of Research into Mathematics, Science, Engineering and Technology Undergraduate Education (PAIR) Program and large awards for institutions, etc., are managed out of NASA Headquarters. Eighty percent of the NASA Explorer schools are located in underserved areas. Seventy percent of the Johnson Space Center summer student internship population is minority and female. Attention is also paid to rural and remote communities. Dr. McDemmond requested that the EAC receive a sampling of the initiatives, and a listing of schools. Dr. Jenkins asked how many additional black researchers have resulted from this educational effort. Dr. Loston agreed to share this information at the next meeting.

Dr. Harvey emphasized the importance of looking at the program as an investment at several levels. Dr. Jordan commented that minority institutions may not be where the only gifted minority students are located. NASA's role is to go find the brightest students, wherever they are. Dr. Harvey agreed that the effort should span all institutions. Dr. McDemmond noted that HBCUs have very bright students but they do not profile like other traditionally white universities. Students come the HBCUs as diamonds in the rough; however, HBCUs are underfunded to provide the infrastructure to help these students. The students graduate into jobs at salary levels equivalent to those of students

graduating from community colleges. The grants from NASA must enrich the culture of the students they are educating. There is a special need at the HBCUs to which NASA should pay attention. Dr. Harvey observed that the proportion of minority students graduating from HBCUs, and then going on to graduate school is higher than that in traditional schools. Ms. Raizen questioned whether the role of the Committee is a lobby group for education within NASA or whether it should make recommendations on how to improve how NASA carries out its Education mission. Dr. Harvey responded that the Committee certainly plays both roles, and expressed interest in getting a greater sense of coordination and synchronization, despite the high-quality materials being produced. Mr. Johnson commented that he has heard NASA feels it is not doing enough in education, and that the declining engagement of women is a national crisis. No one is paying attention, even though NASA has been doing more than most. This is the place where NASA can make it happen. Successful NASA programs should be studied to understand why they were so good.

Dr. Gerald “Carty” Monette recounted his experience at Turtle Mountain, and lamented the fact that mainstream schools have failed Native Americans. Tribal Colleges were established to address that failing, The Tribal Colleges have worked with mainstream schools and have graduated many tribal members in education, social work and business administration, but haven’t graduated many students in the science, technology, engineering, and mathematics (STEM) areas due to lack of extra resources and opportunities. The EAC needs to lead the discussion and to encourage a standard for NASA. It should not ignore the mainstream schools, but recognize that they are not serving the minority and underserved populations. He recommended using the infrastructure that has been established.

Dr. Loston averred that NASA is absolutely committed to the underserved. Its goal is to increase the number of students, minority and otherwise, in STEM areas, increase the number of enriched teachers, and allocate dollars to underserved institutions. The University Research Centers (URCs) function in minority institutions. An example of success is Hampton University in Virginia that has moved into the mainstream and is now responsible for a major research and development mission. Dr. Loston added that NASA is also addressing this through S&T scholarships but does recognize that it can do more. NASA must provide reports to the White House annually, wherein activities must be reconciled with investments. The EAC should function as an advisory body and provide feedback on strategy and outcomes. Dr. Jenkins advised NASA to look inside its data to monitor which groups are making progress and if they are responding to NASA’s efforts. Dr. Harvey encouraged members to make requests for information pending the next meeting. Mr. Johnson was surprised to see the lack of emphasis of including women. Dr. Loston mentioned Sally Ride’s program, and Goddard Space Flight Center’s (GSFC’s) women-focused programs; however, NASA may not be there yet in the higher education arena. Dr. Tseng remarked that traditionally, NASA funding has gone to higher education. The Agency should look more into undergraduate education. In addition, native Hawaiians remain underserved because they are not Federally designated as underserved; NASA should look at this high-potential, overlooked population.

## Office of Public Affairs

Mr. Dwayne Brown, the Public Affairs Liaison for the Office of Education, presented an overview of the Office of Public Affairs activities. Change is difficult, but the current transformation is a necessary one. The American public needs to be engaged in the new Vision for Space Exploration. The vision is not a product but a value. The public really doesn't understand what NASA is about. The Harmonic International Company recently performed a scientific survey that clearly illustrated the public's perception of NASA. The public still thinks of NASA as the Apollo Program. Despite enormous publicity, nearly half of the people surveyed don't know what NASA does. The under thirty-five population is not excited about the Space Shuttle or the International Space Station, (ISS) or robotics.

Mr. Brown summed up the state of perception in three categories:

- The Good – the NASA “brand” is strong; the public has a strong desire to know; the older generation is very supportive; the overall public is interested.
- The Bad – poor communication; too many competing messages (NASA has 3000 websites); the public has no knowledge of NASA's mission; inconsistent data; the brand will decline; there is no understanding of the new Vision of Space Exploration; external factors (negative media focus, societal problems, governmental limitations).
- The Not So Ugly – build a stronger message; show clear benefit, clear images, tell a story; communicate all aspects (psychological, physical, sociological); continue and expand Explorer Schools; commitment, cooperation and collaboration from the major Mission Directorates; employ new and recognized “outside” endorsers; build new positive memories.

The under thirty-five group thinks of Challenger and Columbia, primarily, when it thinks of NASA. Education will be a crucial element for Return to Flight (RTF). NASA is entering an extraordinary period. Mr. Johnson expressed disappointment with the Hubble telescope's fate and the backlash from the cessation of the mission. Mr. Brown agreed that the publicity was mishandled and should be considered a ‘lesson learned’.

Dr. McDemmond felt that the NASA Hits document was too wordy; the American public needs shorter word bites. Radio is another venue for getting the message out. To build recognition, Dr. Harvey suggested manufacturing ‘infant head bonnets’, emblazoned with the NASA symbol and the slogan “Next Generation Explorer”, and distributing them to hospital maternity wards.

Destination-driven values were briefly debated - are we going to Mars just because it's there? NASA is developing a video game, and partnering with Burger King (e.g., Mars Rover toys), but it is not enough. The public thinks the NASA budget is as large as the Department of Defense budget. Dr. King remarked that he represents the NASA voice in St. Louis and believes there is a huge population with potential interest. The

communication network is ready to deliver the message- the message needs to be properly packaged. Dr. Harvey also suggested the use of astronauts to deliver this message. Mr. Johnson remarked that Hewlett-Packard has advertised its work with NASA, and there should be other opportunities with other companies to do this. NASA might be the solution to overturning the negative image of the government; there is a lot riding on what NASA is doing. It can help change the conversation on education. Dr. King suggested NASA make available experts to counter negative media attention. Mr. Brown asked the Committee to look at the data and submit ideas for consistent messages, and ways to build positive memories.

### **NASA's Education Enterprise Budget Status**

Ms. Barbara Cherry, Deputy Associate Administrator for the Office of Education, presented budgetary details for NASA Education. The FY05 budget is before the Congress. Its highlights were the Pathfinder initiatives, S&T Scholarship Programs (\$13.7M), Educator-Astronaut Program (\$2.1M) Historically Black Colleges and Universities Program (HBCUs), Hispanic Serving Institutions (HSIs), and Tribal Colleges and University Program (TCUs) support (\$91M). A large portion of the budget (\$61.8M) had been earmarked in FY04, thus the budget is essentially flat through FY09. The Exploration Initiative has not necessarily been embraced by the Congress –as this is an election year, NASA is a big bull's-eye to address federal budget deficit problems. Of the total budget of \$169M, the \$24M Headquarters (HQ) budget represents overhead and salaries, conference support for the Office of Education, contractor support, etc. The GSFC number (\$87.8M) is really a reflection of GSFC's procurement role. The budget is managed at HQ, but Goddard Space Flight Center (GSFC) distributes the funds. The Committee requested a specific breakdown of the elementary/secondary education division budgets. Dr. Jordan requested discourse on more equitable funding distribution between elementary/secondary and higher education targets.

Enterprise funding represents another \$71M for education, managed by the S&T Enterprises. The budget level is determined by each Enterprise. Some of this funding is allocated to Centers. It was noted that the total NASA obligation to universities was approximately \$1.249 billion in FY 2003. Members of the Committee desired clarification of how much management and range of authority Dr. Loston has over the monies, as well as more specific allocation data in terms of programs and Centers. Dr. McDemmond also asked about the allocation of the university monies and how those monies trickle to elementary/secondary schools. The committee asked for a breakdown of the \$1.249 billion. Dr. Jordan asked if Education might be decreased during the transformation due to the consolidation of the Enterprises. Ms. Cherry replied that the Enterprises have been cooperating and discussing increased funding as the Education philosophy permeates the Agency. Mr. Johnson requested a budget breakdown by university, by campus, from top to bottom. Dr. Jenkins was particularly interested in how directly Dr. Loston controls the money. Dr. Loston promised an earnest effort in producing the requested data. Dr. King remarked that while other federal agencies distribute money for education, none of them have carved out an office for education.

## **Program Review Assessment and Evaluation**

Dr. Houston, presented an overview of the direction of the Agency's Education Program. He reviewed NASA's strategic goals and objectives, and invited the Committee to comment on assessment and evaluation, while recognizing the incipient nature of the Office. The Office operates on six principles, formulated by an HQ/Center Working Group chartered in 2003.

The six operating principles are customer focus; appropriate content (as only NASA can); pipeline; diversity; evaluation; and partnerships, leverage and sustainability. Activities during the past year included an effort to identify major programs with budgets over \$100K, reviewing these programs in terms of alignment with the NASA mission, excellence (Exemplary Programs), and areas for improvement. The process provided a broad overview across the Agency. The best programs were those that met all six operating principles. Programs that scored Good or below were asked to submit an improvement plan, to be assessed at a later time. Programs needing improvement were given 30 days to develop a corrective action. If improvement was not achieved, the program was targeted for termination. Another review is planned for a small set of programs at the end of July 2004, which will give the programs more time to improve, and allow the programs to provide feedback to the reviewers.

The office also used Level Zero Exploration requirements to shape its assessment criteria, linking its educational activities to the Mission Statement and the statement that NASA shall identify and implement opportunities to inspire the nation through mission-related activities. The Level One requirements for the role of Education in addressing the vision for Exploration are currently being written; this is an area in which the EAC is critically valuable. Dr. Houston would like to align the six criteria with the rest of NASA, adding cost and feasibility of the project. Intrinsic merit (quality, customer focus, leverage and sustainability, and an imbedded evaluation component in each program) would be one category. Evaluations should show outcome or impact. The other piece is relevance to NASA (content, pipeline, and diversity, cost). Diversity means more women, underrepresented minorities, and the disabled. A single database system must be established. Internal review and assessment will also be included in the process: develop a more rigorous peer-review process for new programs, charge the three division directors with the responsibility for assessment and outcomes, with periodical reporting. External reviewers will be utilized, and cross-cutting programs will be reviewed. Quality, impact and effectiveness will be determined through external reviewers and the EAC. The next steps are database development, an overarching education framework, piloting the new internal evaluation procedure, and then applying the new process to evaluating earmarks, unsolicited proposals, and existing programs. The Office Education has limited resources, and programs may need to be cut in order to achieve the desired alignment. The Office of Education must also have a balanced portfolio of activities addressing all outcomes.

The Explorer Schools are examples of using an embedded evaluation component. A longitudinal database on student participation and progress relative to NASA pipeline

goals must also be established. The Office of Education also plans to establish a timeline for staged cyclical reviews, such that all programs will eventually be evaluated.

Mr. Johnson asked about the peer review process. Dr. Houston envisioned an external evaluator for the entire portfolio. Dr. McDemmond suggested adding budget figures to the single database. Ms. Raizen emphasized implementation and evaluation for outcome against the goals. Mr. Johnson suggested using academia and experts as reviewers, not contractors. Dr. Rosendhal clarified that contractors are used as facilitators, not reviewers. It is very similar to the NSF process.

### **Discussion and Closing Remarks**

Dr. McDemmond was generally satisfied with the summary of issues addressed, and felt that Education should be part of the strategic planning of NASA as a whole. Mr. Johnson felt that a stronger statement should be made, namely that Dr. Loston should sit on the Strategic Planning Council (SPC). Dr. King suggested commending the administrator on elevating Education and suggesting that Dr. Loston be involved in policy-making. Dr. McDemmond motioned to commend the Administrator, and to clearly structure the SPC for the future development of NASA and its Centers; it is essential to have the CEO as a part of the SPC. Mr. Johnson seconded the motion. Dr. Tseng suggested commending the integration and accountability aspect of the transformation strategy, strengthening the argument that Dr. Loston should sit on the SPC to help the Administrator meet his goal. No objections were raised to the concept. Several members requested an update on the language of the recommendations immediately so that the message from the EAC could be disseminated as soon as possible. Dr. Harvey expressed the desire to respond to the Administrator's Update, and received encouragement from the Committee to proceed with a letter.

Public Affairs and the budget were identified as ongoing items for the next meeting. Subcommittees might be convened in the meantime to address some of these items. Once the information is received, it will be clearer as to whether subcommittees may be necessary. Mr. Johnson commented that the proportion of external R&D spent by the Enterprises is an indicator of how much each Enterprise cares about aspects of education. Dr. King was pleased with the detailed approach to evaluation. On the budget issue, the EAC just needs a simple presentation on the budget that answers the questions that were raised. Dr. Harvey remarked that the EAC is still in the learning phase, and is not trying to govern education. Ms. Raizen commended the evaluation process and wanted to know the proportion of funds available for external evaluation. Dr. Jenkins stressed that the committee questions are positive in nature; the whole intent is to be helpful and supportive. Dr. McDemmond mentioned that her institution was sponsoring a "How to Make Video Games" program in tandem with the Urban League (two weeks in early August). It would be good opportunity to leverage NASA's attempt to do the same thing. Dr. Loston expressed gratitude for the Committee's participation and commended them for their insight and input.

**Administrative Session:**

Mr. Johnson reiterated the thought that NASA can be the exemplar for other programs in the government. The ethics briefing was briefly alluded to from the previous meeting, and the desire to quickly dispatch comments to the Administrator was voiced once again. Dr. Harvey reiterated couching the advice in a non-negative fashion, and felt that the Committee was appropriately commenting in a time of great change. Ms. Raizen, who had to leave before the meeting ended, thanked the Committee before she departed. Dr. Harvey reminded the Committee that it had been cautioned about public conversations and making reference to specific activities with which members may be affiliated. Members must take care to avoid conflicts of interest. The meeting was adjourned.

# Appendix A

## Attendees

### Committee Members

William B. Harvey/*American Council of Education - Chairman*  
Harriett L. Jenkins/*Consultant*  
Rose Tseng/*University of Hawaii at Hilo*  
Senta Raizen/*National Center for Improving Science Education*  
Diana Natalicio/*University of Texas at El Paso*  
Gerald Monette/*Turtle Mountain Community College*  
Marie McDemmond/*Norfolk State University*  
Douglas King/*St. Louis Science Center*  
John Jordan/*Mississippi Department of Education*  
Wayne Johnson/*Hewlett Packard*  
Katie Blanding/*EAC-Executive Director*

### NASA Attendees

Adena Williams Loston/*NASA Headquarters, Chief, Office of Education*  
Clifford W. Houston/*NASA Headquarters, Deputy Associate Administrator for Education Programs*  
Min Ying Wei/*NASA Headquarters*  
Dwayne Brown/*NASA Headquarters*  
Debbie Copeland/*NASA Glenn Research Center*  
Annette Mills/*NASA Glenn Research Center*  
Jeanine Hines/*NASA Glenn Research Center*  
John Hairston/*NASA Glenn Research Center*  
Bonnie McClain/*NASA Headquarters*  
Greg Buckingham/*NASA Kennedy Space Center*  
Susan Miller/*NASA – Dryden Flight Research Center*  
Barbara Morgan/*NASA Johnson Space Center*  
Bill Anderson/*NASA Headquarters*  
Mei Mei Peng/*NASA Headquarters*  
Carolyn Knowles/*NASA Headquarters*  
Debbie Biggs/*NASA Headquarters*  
Jeffrey Rosendhal/*NASA Headquarters*  
Michael A. Kincaid/*NASA Johnson Space Center*  
Philip Sakimoto/*NASA Headquarters*  
Gary Kitmacher/*NASA Johnson Space Center*

### Other Attendees

Joan Zimmermann/*Recorder*

# Appendix B

## Presentations

1. *The Role of The NASA Education Enterprise in the Vision for Space Exploration-* Dr. Adena Williams Loston
2. *Scope of Earth Science Education-* Dr. Ming Ying Wei
3. *NASA's Space Science Enterprise-* Dr. Philip Sakimoto
4. *BPRE Education Program-* Bonnie J. McClain
5. *Education Plans/Office of Aeronautics/Office of Space Exploration Systems-* Bill Anderson
6. *Office of Space Flight-* Debbie Biggs
7. *Program Review, Assessment and Evaluation-* Dr. Clifford W. Houston
8. *NASA's Education Enterprise Budget Status-* Barbara Cherry
9. *Vision for U.S. Space Exploration-* Dr. Adena Williams Loston

## *Other*

### Materials distributed

1. NASA Explorer Schools Evaluation Framework, June 13, 2003
2. Report of the President's Commission on the Implementation of United States Space Exploration Policy
3. Office of Space Science- Education/Public Outreach; Phase III Final Evaluation Report, October 2001-October 2003
4. NASA News Press Release 04-205
5. NASA Transformation Talking Points
6. NASA Earth Science Education Plan
7. NASA Explorer Schools Evaluation Brief 2

## Appendix C Committee Listing

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## Appendix D Agenda

### NASA Education Advisory Committee Meeting Hilton Houston NASA Clear Lake Houston, TX June 24-25, 2004

#### Thursday, June 24, 2004

12:00-12:10pm	Meeting Convenes Welcome and Announcements	Dr. William Harvey, <i>Chairman</i> Dr. Adena W. Loston, <i>Associate Administrator for Education</i>
12:10-12:20pm	Introduction of Guest Speaker	Dr. Loston
12:20-1:20pm	Working Lunch The Impact of the Educator Astronaut Program on Elementary and Secondary Education	Ms. Barbara Morgan <u>Educator Astronaut</u>
1:20-2:00pm	Open Discussion	Committee Members
2:00-2:30pm	Review of Recommendations from February EAC Meeting	Dr. Harvey
2:30-3:15pm	The Role of the NASA Education Enterprise in the Vision for Space Exploration with Discussion	Dr. Loston

#### Thursday, June 24, 2004 (Continued)

3:15-3:30pm	Break	
3:30-5:45pm	S&T Enterprise Education Program Update (15 minutes each)	S&T Enterprise Education Leads
	<ul style="list-style-type: none"> <li>➤ 3:30-3:45 Earth Science</li> <li>➤ 3:45-4:00 Space Science</li> <li>➤ 4:00-4:15 Biological &amp; Physical Research</li> </ul>	Dr. Ming-Ying Wei Dr. Phil Sakimoto Ms. Bonnie McClain

- 4:15-4:30 Aeronautics Mr. Bill Anderson
- 4:30-4:45 Exploration Systems Mr. Bill Anderson
- 4:45-5:00 Space Flight Ms. Debbie Brown Biggs
- 5:00-5:45 Discussion/ Q&A Committee Members

5:45pm Adjourn Dr. Harvey

**Friday, June 25, 2004**

8:30-9:00am Reconvene- Review of Day 1 Dr. Harvey

9:00-9:30am Public Affairs Mr. Dwayne Brown  
Public Affairs Officer

9:30-10:15am Program Overview Dr. Clifford Houston  
*Deputy Associate  
Administrator for Education  
Programs*

10:15-10:30am Break

10:30-11:15am Education Budget Status Ms. Barbara Cherry  
Deputy Associate  
Administrator for Education

11:15-11:45am Open Discussion Committee Members

11:45am-12:00pm Closing Remarks Dr. Harvey  
Dr. Loston

12:00pm Meeting Adjourns Dr. Harvey