Achieving Proficiency in Engineering Research and STEM Education Through NASA Initiatives

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INTRODUCTION

Abstract

This project will initiate strong partnership and collaboration between New York City College of Technology (CITY TECH) and Hostos Community College (HCC). CITYTECH is one of the largest minority serving institutions located in the heart of New York City, the most diverse cities in the world. The students population is over 15,000 students (Fall 2009) with more than 60% African American and Hispanics (Fall 2009).
HCC has more than 6500 students of which 69% are females and 76% are African American and Hispanics. The enrollment at CITYTECH from 2006 to 2009 has increased 14% and is still rising, while it has increased 24% at HCC for the same period.
OBJECTIVES

(1) Strengthening students research skills (computational and analytical) by exposing them to different research areas in STEM that are relevant to NASA and related industry,

(2) Helping students to get NASA research experience thru training and internships,

(3) increase the transfer rate of minority students to 4-yrs colleges and graduate schools as well as increasing the number of minority students in STEM.
ACHIEVING THE GOALS

(i) Collaboration with NASA centers so that students can get research opportunities (Marshall and Goddard),

(ii) Introducing two new multidisciplinary courses in both campuses where students can learn and share research experiences and communicate thru an advanced communication system. The courses will be Project Management, and Environmental Remote Sensing, that will help students gain research experience and interact with different scientists and researchers from different disciplines with a focus on NASA related disciplines.
(iii) Adding research components to existing courses including Eng. Siml. and Prsnt. (IND2420), Materials Testing Lab (MECH2426), Comp. Appl. in Mech. Eng. (MECH1240), Differential Equations (MAT360), and Linear Algebra (MAT320).
(iv) Linking the project with existing industries and organizations whose mission is closely related to STEM research and education and NASA missions, including NASA’s New York City Research Initiative (NYCRI), Alliance for Minority Participation (AMP) in CUNY, Proyectoc Access in HCC, NOAA CREST at CCNY which will result in more opportunities for the project to grow,
(v) Designing a webpage within CITYTECH website to show the activities and programs of the CIPAIR project, the website will reflect also students research projects and accomplishments (iv) motivate collaboration between students and faculty from HCC and CITYTECH through classes, research projects, and training.
Partnership with NASA

Partnership with

1- Goddard Space Flight Center in MD
2- Marshal Flight Center, AL
3- New York City Research Initiative sponsored by Goddard Institute for Space Studies.

Two professors and 10 students participated in summer research experience, 2 months, in the three centers above.
Professor Gailani with Roy and Yapah (NYCCT students) and Daniel Worth (NASA Goddard scientist) in a poster presentation in NASA, summer 2011
An opportunity for students to meet, share, and present their summer research experience at the end of the summer. By collaboration with other programs the event attracted over 150 students from the City University of New York. The event hosted a keynote speaker from NASA and director of NASA education office.
2011 Summer Intern Research Summit
New York City College of Technology Amphitheater
300 Jay Street, Brooklyn, NY 11201
Thursday, 7/28/2011

Program Agenda

9:00 – 9:45 AM
Poster set up and preparation

9:45 – 11:20 AM (Amphitheater)
Opening remarks, President of City Tech Russell K. Hotzler, Provost Bonne August, Dr. Frank Scalzo (NASA NYCRI), Dr. Gaffar Gailani (NASA CIPAIR), Dr. Reza Khanbilvardi (NOAA-CREST) Dr. Reginald Blake (NSF-REU), Dr. Leon Johnson (CUNY/GSFC HEC), and Dr. Neville Parker (NSF-LSAMP)

Comments from Dr. Ming-Ying Wei, NASA HQ Manager of Earth Science Education Programs
Keynote Speaker Dr. Charles Camarda, NASA Management Astronaut

11:25 – 12:25 PM (Amphitheater)
Oral Presentations

12:25 – 1:30 PM (Cafeteria, 1st and Ground Floors)
Lunch
Collaboration

Collaboration with programs that share close mission to NASA CIPAIR is important
Pre-internship Workshop

To prepare students psychologically before starting the internship. All participating students were already accepted in an internship.

Topics in this workshop included but not limited to:

1- writing research papers
2- how to communicate with mentors
3- how to make the internship a career success
4- after the internship
The Internship Seminar

Is held once every semester

The purpose is to guide students to internet applications and how and where to look for internship.

NASA CIPAIR collaborates with many programs to held this seminar
Dynamic Women in Leadership Forum

In Celebration of Women’s History Month

Distinguished Guest Speaker:
Monserrate C. Román, Chief Microbiologist
NASA/ Marshall Space Flight Center

Thursday, March 24, 2011
3:30-6:00pm
Savoy Multipurpose Room

Panelists will include
Dynamic Women with Careers in
Business, Health, Education,
Government, and Politics.

Class participation encouraged.

Refreshments will be served.
DISSIMINATION OF THE PROJECT

A website that enables students to apply to NASA internships is important. Also it helps students to communicate with NASA CIPAIR Co-PIs.
In the News

HOSTOS COMMUNITY COLLEGE STUDENTS HEADED TO NASA

Monday, June 6, 2011 (New York) - Three accomplished students from Eugenia María de Hostos Community College will participate in a ten-week summer program at NASA’s Goddard Space Flight Center in New York City and Greenbelt, Maryland, and the Marshall Space Flight Center in Huntsville, Alabama. The selection of Nicolas De Jesus, Andia Polanco, and Adrian Posada came about as a result of the Achieving Proficiency in Engineering Research and STEM Education NASA Initiative, a three-year collaborative project between the New York City College

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City Tech Receives NASA Grant: The Sky is Not the Limit

City Tech is excited to announce the receipt of its first grant from the National Aeronautics and Space Administration (NASA). The three-year, $442,500 grant is earmarked for the College’s project, “Achieving Proficiency in Engineering Research and STEM Education Through NASA Initiatives.”

As a result, City Tech students majoring in science, technology, engineering and mathematics (STEM) fields are working as full-time interns for eight to ten weeks this summer on research projects with NASA and Goddard Institute for Space Studies (GISS).

Brooklyn Daily Eagle
An external evaluator, Quill Associates Inc., is hired to evaluate the project.

**Quantitative**
- Demographic data, numbers of student participants, limited outcomes data
- Sources: Numerical data collected by PI and Co-PIs; numerical data from student surveys

**Qualitative**
- Pre and post-surveys of students
- Interviews with PI, Co-PIs, partners, others
- Project documents (course materials, meeting notes, website)
- Student focus groups
Lines of Inquiry

- New Curriculum, Research Opportunities
- Building Partnerships
- Fostering Student Interest & Participation
- Quality of Student Experience
- Effect on Educational & Career Choices
- Outcomes
This photo is taken where students are conducting the experimental part of their research. Left to right:
Yapah Berri, student intern from City Tech
Joy Quill, External evaluator, Quill Assoc. Inc, for NASA CIPAIR at City Tech
Dan Kaufman, NASA Mentor, Mechanical Analysis and Simulaiton Division, NASA Goddard.
Roy ST. Furcy, student intern from City Tech
### SURVEYS

Extent of student agreement with statements about NASA and Aerospace Careers

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly or Somewhat Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat or Strongly Disagree</th>
<th>Mean</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I would like to know more about NASA.</td>
<td>89% (96)</td>
<td>8% (9)</td>
<td>3% (3)</td>
<td>4.56</td>
<td>108</td>
</tr>
<tr>
<td>2. I would like to know more about student research internships at NASA.</td>
<td>94% (101)</td>
<td>4% (4)</td>
<td>2% (2)</td>
<td>4.65</td>
<td>107</td>
</tr>
<tr>
<td>3. I would like to know more about student research internships in the aerospace industry.</td>
<td>91% (98)</td>
<td>6% (6)</td>
<td>4% (4)</td>
<td>4.50</td>
<td>108</td>
</tr>
<tr>
<td>4. I would seriously consider a research internship with NASA or an aerospace company.</td>
<td>88% (93)</td>
<td>9% (9)</td>
<td>4% (4)</td>
<td>4.48</td>
<td>106</td>
</tr>
<tr>
<td>5. I would be interested in an internship at a NASA center in another state.</td>
<td>69% (74)</td>
<td>17% (18)</td>
<td>14% (15)</td>
<td>3.90</td>
<td>107</td>
</tr>
<tr>
<td>6. I would be interested in an internship, but only in New York City.</td>
<td>65% (68)</td>
<td>19% (20)</td>
<td>16% (17)</td>
<td>3.82</td>
<td>105</td>
</tr>
<tr>
<td>7. I would seriously consider an engineering career at NASA or in the aerospace industry.</td>
<td>87% (92)</td>
<td>9% (9)</td>
<td>5% (5)</td>
<td>4.38</td>
<td>106</td>
</tr>
<tr>
<td>8. My family and friends would encourage me to pursue a career at NASA or in the aerospace industry.</td>
<td>79% (85)</td>
<td>16% (17)</td>
<td>5% (5)</td>
<td>4.34</td>
<td>107</td>
</tr>
</tbody>
</table>
Students comments

- NASA has been inspiring me for the last decade or so. Due to family involvement and financial crisis, I was unable to continue my education but now I am glad I have reached this far and have one year left for my BA. One day I dream of working with NASA.

- NASA rocks!

- It has been my dream to work for NASA on a large team. I love aerospace.

- I’ve trying for a summer internship at NASA for over a year. I am really interested in everything about engineering and physics. It would be one of the highlights of my engineering career. By the way I am really good in math.

- One of my dreams is to participate in a NASA research internship!

- I love engineering and if I had the chance to do an internship here in New York I would.
Students interested in participating in the second session of the internship Seminar scheduled for November 17th, 2011.
Survey of Preinternship Workshop

Student's Agreement Level

- Question #3
- Question #4
- Question #5
- Question #6
- Question #7
- Question #8
- Question #9
- Question #10

- Strongly Agree
- Moderately Agree
- Neither Agree or Disagree
- Moderately Disagree
- Strongly Disagree
What you liked least about the program/workshop?

Repetitive
A lot of information to take in on one day
A record of the session’s speakers for later listening
Room was too cold
Program/workshop was short
PowerPoint presentation were very short
People arriving late and probably disrupted the flow of the workshop

Suggestions that would enhance the program/workshop

Smaller group discussions/smaller venue/make it more intimate
Borden the program/workshop not only for interns but for others as well
Schedule the program/workshop on days it does not interfere with CUNY graduations
Less presenters, most of them reference the same thing
Industry professional speakers
Any other comments
Very well put together /organized
Information was very useful /encouraging

-Topics of interest for future program/workshops
Resume workshop with internships
Different careers you can get with a PHD
Understanding different types of internships
Consider students that have difficult home environments
Dress codes
Thank you for your attention