AC 2009-536: ENHANCING UNDERGRADUATE RESEARCH INFRASTRUCTURE

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Enhancing Undergraduate Research Infrastructure

Abstract
Virginia State University has conducted a formal undergraduate research mentoring program (URMP) for the STEM areas. This program is supported by a grant from NSF under the HBCU UP program. The goal of the URMP is to enhance the undergraduate research infrastructure at Virginia State University. The program set measurable objectives for the first two years. In addition, the URMP set twelve tasks that were expected to be pursued by research mentors as well as the students under this program. A total of 11 faculty members and 51 students participated in the URMP program during the first year. This is 73% of the target level that is set for two years for faculty participation. This also exceeded the target level for student participation. This article deals with the experience of developing policies, procedures, and instruments for recruitment of faculty and students, establishment of measurable objectives and expectations, assessment, evaluation, and improvement of mentoring program. The article also presents the outcomes of the program and the lesson that was learned during the first year.

Introduction
In 2006, Virginia State University (VSU), America's first fully state supported four-year institution of higher education learning for African Americans and one of the seventeen 1890 Land-Grant Institutions, was awarded a grant from the National Science Foundation under the HBCU UP program to increase the numbers of STEM graduates from an average of 70 to over 105 per year within five years. This project is a comprehensive four-phase STEM program that includes (1) an Undergraduate Bridge (UGB), (2) Course Structure Reform activities (CSR), (3) Student and Faculty Enrichment (SFE) components and (4) a Graduate School Bridge (GSB). Phase one is designed to attract, prepare and give STEM interested high school students an opportunity to explore, learn and experience several STEM disciplines. Phase two is aimed at improving students’ skills and retention in STEM areas through course and curriculum enhancement, new and advance teaching technology especially for the gatekeeper courses. Phase three provides students and faculty opportunities to enhance their knowledge and research skills through specially designed learning activities. Phase four ensures smooth transition of STEM undergraduates into highly competitive graduate school programs. The project's management plan is lead by the faculty members from Engineering and Mathematics Departments.

The project designed activities based on the following strategies: (1) encouraging professional development in the technology context, and (2) promoting interdisciplinary scientific research. Pre-college and undergraduate student participation in the sciences, particularly in research, is a major challenge that is addressed by this project. Diversity of scientific disciplines is encouraged under this project. Some of the most challenging and exciting research topics today are found at the intersections of disciplines and sub-disciplines. This grant established partnerships with STEM academic departments, industries, and other projects and provided opportunities for students to engage in interdisciplinary scientific research projects within the broader domains of the arts and sciences areas at our institution.

Needs Assessment
The NSF and the National Science and Technology Council Committee of Science, report that science, technology, engineering, and mathematics (STEM) are vital to the continuing health and prosperity of the United States. Almost every job imaginable will require some knowledge of these fields. To meet the demands of an increasingly technological society requires the full participation and maximum development of all human resources, particularly women, minorities and persons with disabilities—groups traditionally underrepresented in STEM fields.
In 2001, under the direction of the Dean of the School of Engineering, Science, and Technology (SEST) and the Dean of the School of Graduate Studies and Research (GSR), VSU performed an extensive self-study (HBCU-UP Planning grant) on its STEM program. Through this study, the following needs were identified:

1. Develop state of the art programs in Computer Engineering, Computer Science, and Manufacturing Engineering and obtain Accreditation Board of Engineering and Technology (ABET) accreditation for these programs by 2006.
2. Purposeful restructuring of curricula to link together courses or coursework along with sound assessment components so that students find greater coherence in what they are learning and greater interaction with faculty and peers.
3. Improve retention and the recruitment of quality students.
4. Provide research opportunities for faculty and undergraduate students.
5. Increase the number of STEM students going to graduate school.

**General Implementation Plan:**
To successfully meet the above objectives, the following flowchart illustrates the HBCU-UP approach to attract, educate and advance minority students into STEM disciplines:

![Flowchart](Image)

Figure 1 VSU-HBCU UP Program Description
As seen in figure 1, VSU-HBCU UP program will have four components: (1) Undergraduate Bridge, (2) VSU Course Structure Reform, (3) Student and Faculty Enrichment, and (4) Graduate Bridge. The Undergraduate Bridge enriches the science and technical educational experiences of promising high school students and begins a process of selecting high achievers from among these students to participate in T-STEM. The VSU Course Structure Reform Component enriches learning and increases retention of STEM students by changing the way students are taught, tutored and mentored in introductory courses in biology, chemistry,
engineering, and mathematics. The Student and Faculty Enrichment Component is to increase the rate of faculty and student collaboration in research and provides enriching scholarly activities for both faculty and students in their respective disciplines. The Graduate Bridge component provides research involvement opportunities on and off campus and ensures proper graduate school preparation and exposure and encouragement to move from undergraduate matriculation to graduate matriculation.

**Assessment Plan**
The project is employing NSF’s Six Stages assessment strategy for assessment, evaluation, and improvement of the projects. The strategies are:
1. The Conceptual Model
2. The Evaluation Questions
3. The Evaluation Design
4. Collecting Data
5. Analyzing Data
6. Dissemination

This model was presentation by Dr. Josephine D. Davis of Fort Valley State University during the September 2004 QEM workshop and is adopted by the VSU-HBCU UP project. The conceptual model for the VSU T-STEM project is as follow:

![Conceptual Model Diagram]

**Figure 2- Conceptual Model**

The metrics for assessing the primary goals of TSTEM are carried out through an interconnected data collection system. The evaluation and assessment plan is directed by an external program evaluator.

**Methodology**
The sample consists of all Virginia State University students enrolled in STEM programs as recorded using the Self Evaluation Indicator System (SEIS-2004) within the five years following the commencement of the T-STEM program at the University. Using the student as a unit of analysis, this sample allows investigation of the interaction of the components of the T-STEM program and the expected outcomes associated. Measures of performance consistent with the outlined goals of the program include overall GPA, number of STEM graduates, and number of students advancing to study in graduate STEM programs. Other descriptive measures include assessment of faculty attitudes toward the program, observations of classroom interaction, and
various aspects of the student population such as learner characteristics and attitudes toward the program. The components of the program itself will also provide explanatory information relative to syllabus composition and the generation of scientific inquiry within each programmatic element. Data collection during each phase of the program is needed in order to successfully evaluate the effects of the components of the program. Over the course of the study, data will be compiled at the student level in order to provide insight into effects occurring over two or more years.

**Developing Partnerships**

To improve the efficiency of utilizing the research and development funds and also collecting accurate data, the T-STEM developed a partnership with the Summer Transportation Institute Program (STIP)(funded by Department of Transportation), DuPont Summer Science and Engineering Institute (funded by DuPont), VSU-MSEIP Projects (two projects funded by Department of Education), VSU Research Initiation Grant (RIG) (funded by VSU), and the Research Infrastructure for Minority Institution (RIMI) project (funded by the National Institute of Health) projects.

Under this partnership, VSU established an office to assist project directors with small grants with administrative assistance. This includes travel arrangement, purchasing, sending correspondence, tracking budgets, preparing reports, arranging field trips for students, staffing residence halls for the summer programs under one organization for residential programs, hiring student counselors during the summer, arranging meetings, organizing research conferences, etc.

**Summer Transition and Enhancement Program (STEP)** – (Fully supported by T-STEM). STEP for high achiever rising college freshmen. This is a four week residential summer program that provides a smooth transition for participants from high school to college. STEP students are enrolled in one math and the Freshman English courses. These students receive scholarships as long as their GPA remains above 3.00 and they pursue a STEM discipline as their major of study at VSU. VSU and HBCU UP share the responsibility and amount of funds for the scholarships that are awarded to the STEP students.

**High School Senior Enrichment Program (HSSE)** (Fully supported by T-STEM). This is a 4 week residential program for the high school seniors. HSSE introduces the students to the
fundamentals of engineering through hands-on projects. In addition, a full course (30 hours) SAT preparation module was built in the curriculum. HSSE is established to pursue the following two objectives:

1. To introduce rising high school seniors to STEM fields and boost their desire to select a STEM field for further study and as a potential career.
2. To prepare students for admission to the STEP

**NSF-DuPont Summer Science and Engineering Program (DuPont)** (Supported by T-STEM, DuPont, and Department of Education). This is a non-residential summer program for 10th-12th graders. This program has the following objectives:

1. To increase the interest of pre-college minorities and females in STEM
2. To strengthen the academic background of pre-college minority and female students in areas necessary in entering a STEM field
3. To prepare minority and female pre-college students for course work necessary to be admitted to colleges and universities in science-based programs.
4. To promote Virginia State University among the high school students across the Tri-cities and Southside Virginia

**Summer Transportation Institute (STIP)** (Fully supported by the Department of Transportation) This is a four week residential program for 9th and 10th graders. The STIP has the following objectives:

1. To stimulate and sustain interest in transportation at the secondary education level.
2. To encourage high school students to pursue higher education by exposing them to college life and the benefits of a college education.
3. To promote Virginia State University among the middle and high school students across the Commonwealth of Virginia

**Math and Science Program (MSEIP)** (Supported by T-STEM, DuPont, and Department of Education) – This was a four week residential program. This grant has expired.

**Enhancing Undergraduate Research Infrastructure**

**a. Undergraduate Research Committee**

This committee was established with the following purposes:

1. To enhance students' ability to make presentation in National Conferences
   a. Enhance students’ networking skills.
   b. Increase students' involvement in undergraduate research
   c. Increase VSU’s visibility.
   d. Increase students' interests to pursue graduate education
2. To enhance the foundation of Undergraduate Research by establishing interdisciplinary research activities between departments
3. To involve the STEM Faculty members in undergraduate research mentoring.
4. To establish and manage a VSU Annual Undergraduate Research Conference
b.  **Annual Undergraduate Research Conference**

This is an annual forum for the undergraduate students to present the results of their research. The conference is held in April. Students from other colleges and universities are taking part in this conference. The abstracts for the poster and oral presentations are reviewed by faculty members from VSU and Norfolk State University. This is the third year that VSU have held this conference.

c.  **Undergraduate Research Mentoring Program (URMP)**

The T-STEM established an Undergraduate Research Mentoring Program (URMP) with the following goal and the objectives.

**Goal**

The goal of the Undergraduate Research Mentoring Program (URMP) is to enhance the undergraduate research infrastructure at Virginia State University.

**Objectives for the first two years**

1. Assist fifteen VSU faculty members in STEM disciplines to provide undergraduate research supervision.
2. Recruit at least thirty students majoring in a STEM discipline to participate in the program.

**Tasks and Expectations URMP**

1. Each mentor supervises at least two undergraduate students in research activities;
2. Each student presents the outcome of her or his research at the VSU Undergraduate Research Conference and at least one national/regional research meeting/conference;
3. Each mentor provides input on the guidelines for evaluating students' presentations during the VSU Undergraduate Research Conference;
4. Each mentor provides input in determining a set of outcomes and developing a rubric to measure the expected outcomes for evaluation purpose;
5. Each mentor participates in VSU Undergraduate Research Workshop;
6. Each student and mentor participate in assessing the mentoring program;
7. Each mentor participates in two meetings (one at the end of each semester) to share her or his experiences and views on the mentoring program and assist in program evaluation;
8. The student’s research project may be connected to coursework. However, each research project should be above and beyond the requirements for completing a course;
9. Mentors and students participate in all HBCU UP research activities;
10. HBCU UP will support mentors and students to attend one STEM event held in Virginia per semester;
11. Each student who participates in the URMP is expected to apply for a graduate program in a STEM discipline upon the completion of her/his undergraduate degree program.

**Assessment and Evaluation**

These expectations are used to measure the progress of Undergraduate Research Mentoring Program for 2007-2008. The following instrument was utilized to measure the effectiveness of the program for the first year. The results were presented to the Undergraduate Research Committee during the first meeting in the Fall of 2008 for further evaluation. The Committee
utilized the results for improving the plan of action for the upcoming year.

**HBCU-UP Faculty and Staff Academic Year Accomplishment Form**

Name: 

**This section should be Completed by participating faculty.**

### A. STEM Students Trained in Research Projects

<table>
<thead>
<tr>
<th>Name of Student</th>
<th>Student’s Major</th>
<th>Project Title</th>
<th>Faculty Collaborator (If Applies)</th>
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### B. Number of Students Mentored

Total number: 

Areas in which students received mentoring:

- Supervising Research
- Assisting with Research Opportunity
- Mentoring in Profession
- Assisting with Application to a Graduate Program
- Other:

### C. Submitted Application for External Summer Programs

<table>
<thead>
<tr>
<th>Student/ Mentor Name</th>
<th>University/Institution</th>
<th>Department Area</th>
<th>Title of Research (if conducted)</th>
<th>Duration</th>
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</table>

### D. External Summer Programs Attended

<table>
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<th>Student/ Mentor Name</th>
<th>University/Institution</th>
<th>Department Area</th>
<th>Title of Research (if conducted)</th>
<th>Duration</th>
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### E. Submitted Application for a Graduate Program

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<th>Department Area</th>
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</table>

### F. Obtained an Admission to a Graduate Program

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### G. Attended a Graduate Program

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<th>Department Area</th>
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### H. Professional Meetings, Conferences, Workshops/Seminars Attended

<table>
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<tr>
<th>Student Name</th>
<th>Name of Conference</th>
<th>Location</th>
<th>Date of Conference</th>
<th>Purpose</th>
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### I. Professional Presentations made at Local, Regional, and National Meetings

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<th>Name of Conference</th>
<th>Location</th>
<th>Date of Conference</th>
<th>Title of Presentation</th>
<th>Presenters (student names in bold)</th>
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</table>

### J. Peer Reviewed Publications

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<thead>
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<th>Title of Publication</th>
<th>Date of Publication</th>
<th>Journal and Publication Details</th>
<th>Authors (student names underlined)</th>
</tr>
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</table>
Summary of Finding:
A total of 11 faculty members and 51 students participated in this program. This is 73% of the target level that is set for two years for faculty participation. This also exceeded the target level for student participation. The detailed analysis is as follows:
- STEM Students Trained in Research Projects = 48. This includes the following: Psychology = 11, Physics = 2, Biology = 6, Mathematics = 3, Computer Engineering = 15, Manufacturing Engineering = 9, Chemistry = 2 students.
- Total Number of Projects = 21. Number of Collaborative Projects (Two faculty or more = 8)
- Total Number of Students Mentored = 51. This number includes research activities.
- Number of Submitted Applications for External Summer Programs = 8
- Number of External Summer Programs Attended = 6
- Number of Submitted Applications for Graduate Programs = 11
- Number of Obtained Admissions to Graduate Programs = 7
- Number of Students Attended a Graduate Program = 2
- Professional Meetings, Conferences, Workshops/Seminars Attended = 33
- Professional Presentations made at Local, Regional, and National Meetings = 22
- Peer Reviewed Publications = 6
- Publications Submitted or in Preparation = 4
- Other Publications (books, chapters, etc) = 0

Proposal/Grant Applications Submitted for Internal or External Funding (including travel funds) = 2
External Proposal/Grants Funded (including travel funds) = 3
Partnerships/Collaborators (Ex: other universities, industry, private agencies, government, etc..) = 12

Preliminary Concerns: Lack of student and faculty participation from Agricultural Science, Computer Information Systems, and Computer Science is noted. The HBCU-UP project coordinators will increase efforts to recruit faculty mentors and students from these programs.
d. Research Initiation Grant (RIG)

In 2003, the RIG was established to enhance research infrastructure at VSU. The explicit purpose of the RIG program is to assist the faculty in the initiation of research activities, which will directly lead to the preparation of grant proposals. The long-range intent of the RIG is to increase the extramural funding base of the institution. To achieve this, the short-range goal is to promote grant proposal preparation and submission. Thus, the RIG program supports research activities, which lead to the development of research grants. While the university values all research as an enterprise and values continuing research projects, RIG is not intended to support any or all research, nor to support necessarily on-going projects. The RIG program is intended to cultivate new fundable grant proposals which may have potential positive impact on the academic environment of the university. However, this project encourages the PIs to engage students in their research projects.

Assessment of Research Initiation Grand

In 2007, we conducted an assessment for the effectiveness of RIG for continuation and level of funding for this initiative. The enclosed survey questionnaire was developed to obtain data from the past RIG recipients. The data is used to:

1. Measure effectiveness of RIG in providing Research Opportunities for VSU faculty.
2. Measure effectiveness of RIG in providing Research Opportunities for VSU students.
3. Improve the administration/management of RIG

The questionnaire was distributed during the Spring 2007 semester. The questionnaire has three sections.

1. Questions a, b, and c are for collecting data on PIs research outcomes effected by the RIG project.
2. Questions e and f are for collecting data on students’ researches as a result of RIG.
3. Question 1–7 and item 8 are for collection data for improvement of RIG award.

The following notations were used in the assessment tables:

H = Does not need enhancement
M = Needs some enhancement
L = Needs a lot of improvement

Event though we have included data for the 2006-2007 academic year in our assessment, we have not evaluated the effectiveness of RIG for this period. This is due to the fact that most of the recipients of RIG 2006-2007 have not completed their projects yet. The result of the assessment shows that there is a steady improvement of the impact of RIG on faculty as well as the students’ research in all categories.

Assessment Instrument
Name: «NAME»
Project: «TITLE»
Date of Award: «DATE_YEAR»
a. Have you Completed Your RIG Project?  □ Yes  □ No

Please answer the following if yes you have completed your RIG project:

b. Have you submitted any grant proposal to an external agency as a result of your RIG project?  
□ Yes  □ No

If yes,
Title of the Proposal:
Agency that you Submitted Proposal:
Date of Submission:
Is this proposal funded?  □ Yes  □ No

c. Have published any research article as a result of your RIG project

□ Yes  □ No

If yes,
Title of the article
Journal or proceeding:

d. Did you have any student research assistant for your RIG project?  
□ Yes  □ No

If yes,
e. Did your student assistant(s) publish any article in a journal or proceeding?

□ Yes  □ No

Title of article:

Feedback

Please use the following scale and let us know what area of the RIG administration should be enhanced:

1. Timing of Deadline:

□ Does not need enhancement  □ Needs some enhancement  □ Needs a lot of improvement

Comments:

2. Adequate time is given to prepare a proposal

□ Does not need enhancement  □ Needs some enhancement  □ Needs a lot of improvement

Comments:

3. Timing of the notification of award

□ Does not need enhancement  □ Needs some enhancement  □ Needs a lot of improvement

Comments:

4. Orientation

□ Does not need enhancement  □ Needs some enhancement  □ Needs a lot of improvement

Comments:

5. Loading the budget

□ Does not need enhancement  □ Needs some enhancement  □ Needs a lot of improvement
6. Time limit to complete the project (is one year enough)
☐ Does not need enhancement  ☐ Needs some enhancement  ☐ Needs a lot of improvement

Comments:

7. Administrative issues such as hiring students, purchasing supplies, arranging travel, etc.
☐ Does not need enhancement  ☐ Needs some enhancement  ☐ Needs a lot of improvement

Comments:

8. Please list any other issues that will help us to improve the administration of the RIG.

Figure 5 – Instrument for Data Collection for RIG

Result of the Assessment

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<th>Year</th>
<th>Number of RIGs</th>
<th>Responses</th>
<th>Completed</th>
<th>Proposal Submitted</th>
<th>Funded</th>
<th>Published</th>
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The following is the list of the concerns that the PI expressed about the management of the RIG:

1. Experiences were valuable to me in submitting a response to an RFP from Chesterfield County on a VSU/Chesterfield partnership.

2. Is there a limit to the number of times or how often one can apply for a RIG?

3. Purchasing was a big delay and lots of energy was spent which I thought was wasteful & unnecessary - that was before eVA. This was a major hurdle for my RIG.

4. Adequate coordination in the Purchasing Office is highly needed in order to reduce faculty frustration in expending grant money.

5. I declined the RIG and informed the Provost's office accordingly.

6. By far, the most important issue is more support with identifying grants, and with easier ways to administer them there is still strikingly little support for that!

7. Main thing is to clarify the purpose and expectations of the RIG. Also, need to put more responsibility on the recipient to produce progressive report on how and where funds are used during the implementation. In addition, reports on where the seed money

8. Train faculty (new faculty) on managing their budget. Provide a clear guideline indicating what is expected of the faculty at the end of the project also during the project (i.e. progress report).

9. I found my orientation to FRS to be of little use or insight, there was no rational for the numbers/categories/procedures shown. The paperwork to hire a student is daunting - I worked around that obstacle by paying a stipend instead (which is a one-tim

10. Better mentoring by research faculty who know how to write proposals, methodology, project evaluation and publications (post study). More guidance in social scienc research approaches. Have someone available to monitor/track study progression beginning

11. It is almost impossible to access these funds. The request never process on time, so you end up losing the funds.

12. Perhaps a seminar with RIG recipients over the last five years that focused on the RIG and the research resulting from this. This would provide yet another forum to promote research from among staff and enhance the development of our "research-learning"
13. Initial RIG meeting outlining requirements upon receipt of money. Dates established upon receipt of approval to sign up for financial workshops during the summer so as to start on a timely basis. Provide a little more flexibility with spending.

14. Need more time and/or help to follow Purchasing and State policies for expenditures.

15. We need someone who will directly be involved with the RIGs to help new faculty especially to administer the grant.

16. The purchasing system was a major obstacle that had to be overcome in order to hire students and obtain supplies. Perhaps designating one person to handle all RIG purchasing requests would help.

17. Budget related issues has to be sorted out.

18. The process of how the funds became available, what is needed to use the funds, and a very poor purchasing dept. are major issues.

**Findings and Improvement**

The assessment showed that the RIG was a successful initiative in providing opportunity for the students to conduct research. This project also assisted faculty to obtain external funding to extend their research skills. However, RIG PIs expressed need for administrative assistance. VSU has established an office to provide such assistance to PIs with small grants.

**Summary of the accomplishment of the T-STEM during the past two years**

The following are the summaries of T-STEM for two years. The complete data for the current year which will be available in June 2009 is not included in this report. However, this data will be presented in the ASEE Annual Meeting.

a. **Summary for 2006-2007 Academic Year**

The HBCU UP Program supported: One Graduate Research Assistant, One Graduate Teaching Assistant, 18 Interns (13 – on campus and 5 – off campus), 32 undergraduate students made presentations during the VSU Undergraduate Research Conference, one student attended the Optical Diagnostic Imaging from Bench to Bedside Conference at the National Institutes of Health, Bethesda, MD and two students attended the Mathematical Association of America Regional Undergraduate Mathematics Conferences Program, The Society for Mathematical Biology, and BIO SIGMAA in Boone, NC. The program also supported students who participated or attended the STEM Orientation (30 students), STEM Bridge Program (55 students), STEM workshop (20 students), STEM National Conference (7 students and STEM Summer Program (26 students). Fifteen (15) students serves as Peer Tutor and 76 students has received Peer Tutoring. Twenty six (26) students had attended the Career Seminar offered for freshmen. Financial support was given to 68 students through the HBCU UP Program.

Support was also given to faculty members: 22 faculty members attended the faculty development workshop, “Directing Undergraduate Research,” 20 participated at the VSU Undergraduate Research Conference. Twelve faculty members participated in the summer enrichments (STIP, HSSE and Dupont).

b. **Summary for 2007-2008 Academic Year**

Forty three (43) undergraduate students made presentations during the VSU Undergraduate Research Conference, one student made a presentation at the ACS National Meeting in New Orleans. Twenty two (22) students attended the NCUR22 Conference in Salisbury, MD. Five (5) of these students made a poster presentation. Nine (9) undergraduate students attended the HBCU UP National Conference and made paper and poster presentations. Four (4) undergraduate students
attended the Transportation Research Board Annual Meeting in Washington DC. Two (2) of these students received an award for their presentations. The HBCU UP supported two (2) graduate students to attend the National Black Graduate Student Annual Conference in Chicago, IL. Two students made a presentation in Biosensors Conference in Shanghai, China. The program also supported students who participated or attended the STEM Orientation (34 students), STEM Bridge Program (62 students), STEM workshop (20 students), and STEM Summer Program (34 students).

Impact on Institution

Virginia State University has updated its 20/20 Vision plan. The plan addresses the needs for providing opportunities for research for faculty as well as graduate and undergraduate students. In addition, VSU is pursuing additional undergraduate and graduate STEM programs under its revised 20/20 Vision Plan.

The VSU HBCU-UP project has provided limited administrative assistance to STEM related PIs by awarding them small grants. The major outcome of this was optimizing resources that are available for STEM related projects. This was especially helpful for summer pre-college programs. Now, the MSEIP (Department of Education), HBCU UP, STIP (Department of Transportation), and DuPont programs share administration responsibility during the summer. Recently, LSAMP and RIMI (NIH) added to this partnership. This further enhanced the dialogue and interdisciplinary projects among the STEM faculty.

The Computer Science, Computer Engineering, and Manufacturing Engineering programs obtained ABET accreditation.

A mini-grant project that is sponsored by the NIH-RIMI and HBCU UP that is required to utilize students in research is established. The focus of this project is to pave the way for the students to pursue graduate education in bio-medical science/engineering areas. This is a new project and has not been implemented yet.

The three year implementation of the program had a significant positive impact on VSU’s strategies for improvement of the quality of science and mathematics education. This enhanced the institutional capability to move toward level 6 institution status. The initiative has provided opportunity for faculty and students to have close interactions that foster the academic potential of minorities in the STEM fields. The program exposed students to modern teaching techniques and learning experience in gatekeeper courses.

Acknowledgement

Authors wish to express their gratitude to Mr. Alan Boese, Director of the Adult Education at VSU for his frequent inputs in this project.