

<b>REPORT DOCUMENTATION PAGE</b>			Form Approved OMB NO. 0704-0188		
<p>The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA, 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</p>					
1. REPORT DATE (DD-MM-YYYY) 28-04-2015		2. REPORT TYPE Final Report		3. DATES COVERED (From - To) 1-Feb-2014 - 31-Jan-2015	
4. TITLE AND SUBTITLE Final Report: Building a Research Infrastructure for the Sciences at Bennett College			5a. CONTRACT NUMBER W911NF-14-1-0074		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER 206022		
6. AUTHORS Willietta Gibson			5d. PROJECT NUMBER		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAMES AND ADDRESSES Bennett College 900 E. Market St  Greensboro, NC 27401 -3249			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS (ES) U.S. Army Research Office P.O. Box 12211 Research Triangle Park, NC 27709-2211			10. SPONSOR/MONITOR'S ACRONYM(S) ARO		
			11. SPONSOR/MONITOR'S REPORT NUMBER(S) 64690-LS-REP.1		
12. DISTRIBUTION AVAILABILITY STATEMENT Approved for Public Release; Distribution Unlimited					
13. SUPPLEMENTARY NOTES The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation.					
14. ABSTRACT The primary goal of the proposal, Building a Research Infrastructure for the Sciences at Bennett College was to acquire equipment to establish an interdisciplinary laboratory with a focus on Nutritional Food Science; designed to provide new capabilities for faculty to conduct research as well as to strengthen our ability to train and prepare students to enter into STEM fields and graduate level STEM programs. To date, we have ordered the majority of the equipment and have established the laboratory. We are also in the process of scheduling training for faculty with the vendors using the various new pieces of equipment. After training, we will begin student instruction which					
15. SUBJECT TERMS to acquire equipment to establish an interdisciplinary laboratory with a focus on Nutritional Food Science					
16. SECURITY CLASSIFICATION OF:		17. LIMITATION OF ABSTRACT	15. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON	
a. REPORT	b. ABSTRACT			Willietta Gibson	
UU	UU	UU		19b. TELEPHONE NUMBER	
				336-517-1203	



## Report Title

Final Report: Building a Research Infrastructure for the Sciences at Bennett College

### ABSTRACT

The primary goal of the proposal, Building a Research Infrastructure for the Sciences at Bennett College was to acquire equipment to establish an interdisciplinary laboratory with a focus on Nutritional Food Science; designed to provide new capabilities for faculty to conduct research as well as to strengthen our ability to train and prepare students to enter into STEM fields and graduate level STEM programs. To date, we have ordered the majority of the equipment and have established the laboratory. We are also in the process of scheduling training for faculty with the vendors using the various new pieces of equipment. After training, we will begin student instruction which will include the progression of the projects that were proposed in our narrative.

---

**Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:**

**(a) Papers published in peer-reviewed journals (N/A for none)**

<u>Received</u>	<u>Paper</u>
-----------------	--------------

**TOTAL:**

**Number of Papers published in peer-reviewed journals:**

---

**(b) Papers published in non-peer-reviewed journals (N/A for none)**

<u>Received</u>	<u>Paper</u>
-----------------	--------------

**TOTAL:**

**Number of Papers published in non peer-reviewed journals:**

---

**(c) Presentations**

Number of Presentations: 0.00

---

**Non Peer-Reviewed Conference Proceeding publications (other than abstracts):**

Received      Paper

**TOTAL:**

Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

---

**Peer-Reviewed Conference Proceeding publications (other than abstracts):**

Received      Paper

**TOTAL:**

Number of Peer-Reviewed Conference Proceeding publications (other than abstracts):

---

**(d) Manuscripts**

Received      Paper

**TOTAL:**

Number of Manuscripts:

---

**Books**

Received      Book

**TOTAL:**

Received      Book Chapter

**TOTAL:**

**Patents Submitted**

---

**Patents Awarded**

---

**Awards**

---

**Graduate Students**

NAME

PERCENT SUPPORTED

**FTE Equivalent:**

**Total Number:**

**Names of Post Doctorates**

NAME

PERCENT SUPPORTED

**FTE Equivalent:**

**Total Number:**

**Names of Faculty Supported**

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
<b>FTE Equivalent:</b>	
<b>Total Number:</b>	

**Names of Under Graduate students supported**

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
<b>FTE Equivalent:</b>	
<b>Total Number:</b>	

**Student Metrics**

This section only applies to graduating undergraduates supported by this agreement in this reporting period

The number of undergraduates funded by this agreement who graduated during this period: ..... 0.00

The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields:..... 0.00

Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale):..... 0.00

Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense ..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and will receive scholarships or fellowships for further studies in science, mathematics, engineering or technology fields:..... 0.00

**Names of Personnel receiving masters degrees**

<u>NAME</u>
<b>Total Number:</b>

**Names of personnel receiving PHDs**

<u>NAME</u>
<b>Total Number:</b>

**Names of other research staff**

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
<b>FTE Equivalent:</b>	
<b>Total Number:</b>	

**Sub Contractors (DD882)**

## **Inventions (DD882)**

## Scientific Progress

Progress made towards goals:

Biology- The major equipment ordered for cell culture includes the biological safety cabinet, cryogenic tank, liquid nitrogen tank and the incubator which was set up in Pfeiffer Science Room 300. The instrumentation for gene expression is housed in Pfeiffer Science Laboratory Room 202. The Real-Time PCR machine, Western Workflow, Nanodrop and SpetraMax spectrophotometer were ordered by the end of September. The 7500 Fast Real Time PCR instrument with the computer was installed. All of the calibrations were completed. Training was completed on the maintenance and software menus. The V3 Western Workflow equipment was installed. Since the progress report, we've also ordered two new pieces of equipment, the 96 well plate centrifuge and a 15ml multipurpose centrifuge for cell culture analysis.

Currently, we are also in the process of discussing the parallels and differences between the proposed Research Methods course and our institution's current Research Methods course, RS 200 which is a general education requirement for all majors. This proposed course will focus solely on STEM majors. This course will not be implemented as planned in the spring until we gain full approval from the College. We've also have conversations about introducing research and scholarship throughout the curriculum for our Quality Enhancement Plan (QEP) from our accrediting body-Southern Association of Colleges and Schools (SACS). One of the suggestions for our new QEP topic is "Promoting a culture of students participating in scholarship and engaged learning". Students will be engaged in active, inquiry based learning and active participants in research activities. This topic as well as the research methods course is still in discussion as it impacts the entire college.

Chemistry-A Shimadzu IRAffinity FTIR spectrophotometer was ordered and installed in Pfeiffer Science Laboratory room 300 as of September 2014. Faculty members in the Department of Chemistry have received training from the Shimadzu Technician on the operation of this instrument. During October 2014, two chemistry majors have received instruction on the procedures for analysis of molecules by the instrument as a part of the Chemistry Research course required for these chemistry majors. The course research project involves analysis of structural properties of penicillins which can inhibit degradation of the antibiotics by penicillinase enzymes. The instrument will also be used for chemical analysis of foods by students in the project described in the DOD Grant proposal. The Thermo Scientific Dionex HPLC unit has been ordered and will be installed in Pfeiffer Science Laboratory Room 300 by the end of October 2014. This instrument will also be used for chemical analysis of foods in the DOD Grant project.

Since the progress report, the Thermo Scientific Dionex HPLC was installed in room 300 during the Spring Semester-2015. Faculty members in the Department of Chemistry received training in the operation of the instrument during that semester. The training was provided by a technician from the Thermo Scientific Company. This instrument will be used for chemical analysis of foods in the DOD Grant project.

Psychology- Dr. Campbell was able to use the laboratory to prepare a proposal for the National Conference on Race and Ethnicity. She will serve as a panelist with colleagues from three different institutions. Normally, it has been difficult for her in the past to collaborate since she did not have access to a current version of SPSS. At times, outside colleagues are willing to share their data files but she could not access them. This process aligns with Goal 1 of our grant by allowing her to foster research relationships that translate into on campus projects due to the fact that she now has the software that allows her to communicate, statistically with collaborators.

For the spring semester, Dr. Campbell was able to engage two students with the use of the computers and SPSS software set up in the laboratory. This was made possible by teaching the course Independent Study in Psychology (PS 460). Nevertheless, she would have been unable to teach the course without a proper laboratory space. This progress aligns with Goal 2 of the grant as she was able to incorporate research into an intensive course.

During this course, the initial stages of the Research Project 3 began. It was proposed that the third research project would examine the perceptions of daily nutritional needs for minority women and positive physical and mental health. We decided to first assess the levels of stress among our students as preliminary assessments for their mental and physical health needs in addition to their levels of Black identity. This pilot study included forty-one Bennett College students with other half self-reporting their classification as Freshwomen with ages 18 – 19 years old. Among the battery the questionnaires, we included a list of stressors that are commonly reported by African American females. Of the ninety items, the most noted stressors were test preparation followed by taking time for oneself. Third was finding a job with weight concerns fourth. This preliminary assessment is in accordance with our Research Project 3 by providing evidence of the stressors including time management and financial stability as they both relate to weight management. During the summer, plans will be developed for the next stage of the project.

Both students were able to present at Interdisciplinary Research Day held each year on Bennett College's campus.

Challenges

Our major goal of setting up the Interdisciplinary Laboratory is completed; however some equipment was ordered after the summer which was later than originally planned. The other challenge is seeking funding for supplies to carry out the proposed activities. The Department lab supply budgets can support a part of the funding for these supplies but we are also currently actively seeking funding opportunities. Due to this delay, we made some modifications to our timeline.

## Technology Transfer

N/A

## DEPARTMENT OF DEFENSE FINAL PROGRESS REPORT

### Part I: Initial Progress

The primary goal of the proposal, *Building a Research Infrastructure for the Sciences at Bennett College* was to acquire equipment to establish an interdisciplinary laboratory with a focus on Nutritional Food Science; designed to provide new capabilities for faculty to conduct research as well as to strengthen our ability to train and prepare students to enter into STEM fields and graduate level STEM programs. To date, we have ordered the majority of the equipment and have established the laboratory. We are also in the process of scheduling training for faculty with the vendors using the various new pieces of equipment. After training, we will begin student instruction which will include the progression of the projects that were proposed in our narrative.

### Part II: A. Detailed Description of Goals

The goals of the grant were to:

GOAL 1: Allow for new capabilities of current and future faculty to engage in on-campus research.

GOAL 2: Offer an opportunity to integrate research in laboratory intensive courses that will improve the curricula as well as increase the percentage of underrepresented minority females seeking graduate level STEM degrees.

GOAL 3: Provide an outreach mechanism to the Early/Middle College located on Bennett College's campus.

Progress made towards goals:

**Biology-** The major equipment ordered for cell culture includes the biological safety cabinet, cryogenic tank, liquid nitrogen tank and the incubator which was set up in Pfeiffer Science Room 300. The instrumentation for gene expression is housed in Pfeiffer Science Laboratory Room 202. The Real-Time PCR machine, Western Workflow, Nanodrop and SpetraMax spectrophotometer were ordered by the end of September. The 7500 Fast Real Time PCR instrument with the computer was installed. All of the calibrations were completed. Training was completed on the maintenance and software menus. The V3 Western Workflow equipment was installed. Since the progress report, we've also ordered two new pieces of equipment, the 96 well plate centrifuge and a 15ml multipurpose centrifuge for cell culture analysis.

Currently, we are also in the process of discussing the parallels and differences between the proposed Research Methods course and our institution's current Research Methods course, RS 200 which is a general education requirement for all majors. This proposed course will focus solely on STEM majors. This course will not be implemented as planned in the spring until we gain full approval from the College. We've also have conversations about introducing research

and scholarship throughout the curriculum for our Quality Enhancement Plan (QEP) from our accrediting body-Southern Association of Colleges and Schools (SACS). One of the suggestions for our new QEP topic is “Promoting a culture of students participating in scholarship and engaged learning”. Students will be engaged in active, inquiry based learning and active participants in research activities. This topic as well as the research methods course is still in discussion as it impacts the entire college.

**Chemistry-**A Shimadzu IRAffinity FTIR spectrophotometer was ordered and installed in Pfeiffer Science Laboratory room 300 as of September 2014. Faculty members in the Department of Chemistry have received training from the Shimadzu Technician on the operation of this instrument. During October 2014, two chemistry majors have received instruction on the procedures for analysis of molecules by the instrument as a part of the Chemistry Research course required for these chemistry majors. The course research project involves analysis of structural properties of penicillins which can inhibit degradation of the antibiotics by penicillinase enzymes. The instrument will also be used for chemical analysis of foods by students in the project described in the DOD Grant proposal. The Thermo Scientific Dionex HPLC unit has been ordered and will be installed in Pfeiffer Science Laboratory Room 300 by the end of October 2014. This instrument will also be used for chemical analysis of foods in the DOD Grant project.

Since the progress report, the Thermo Scientific Dionex HPLC was installed in room 300 during the Spring Semester-2015. Faculty members in the Department of Chemistry received training in the operation of the instrument during that semester. The training was provided by a technician from the Thermo Scientific Company. This instrument will be used for chemical analysis of foods in the DOD Grant project.

**Psychology-** Dr. Campbell was able to use the laboratory to prepare a proposal for the National Conference on Race and Ethnicity. She will serve as a panelist with colleagues from three different institutions. Normally, it has been difficult for her in the past to collaborate since she did not have access to a current version of SPSS. At times, outside colleagues are willing to share their data files but she could not access them. This process aligns with *Goal 1* of our grant by allowing her to foster research relationships that translate into on campus projects due to the fact that she now has the software that allows her to communicate, statistically with collaborators.

For the spring semester, Dr. Campbell was able to engage two students with the use of the computers and SPSS software set up in the laboratory. This was made possible by teaching the course Independent Study in Psychology (PS 460). Nevertheless, she would have been unable to

teach the course without a proper laboratory space. This progress aligns with *Goal 2* of the grant as she was able to incorporate research into an intensive course.

During this course, the initial stages of the *Research Project 3* began. It was proposed that the third research project would examine the perceptions of daily nutritional needs for minority women and positive physical and mental health. We decided to first assess the levels of stress among our students as preliminary assessments for their mental and physical health needs in addition to their levels of Black identity. This pilot study included forty-one Bennett College students with other half self-reporting their classification as Freshwomen with ages 18 – 19 years old. Among the battery the questionnaires, we included a list of stressors that are commonly reported by African American females. Of the ninety items, the most noted stressors were test preparation followed by taking time for oneself. Third was finding a job with weight concerns fourth. This preliminary assessment is in accordance with our Research Project 3 by providing evidence of the stressors including time management and financial stability as they both relate to weight management. During the summer, plans will be developed for the next stage of the project.

Both students were able to present at Interdisciplinary Research Day held each year on Bennett College’s campus.

### Challenges

Our major goal of setting up the Interdisciplinary Laboratory is completed; however some equipment was ordered after the summer which was later than originally planned. The other challenge is seeking funding for supplies to carry out the proposed activities. The Department lab supply budgets can support a part of the funding for these supplies but we are also currently actively seeking funding opportunities. Due to this delay, we made some modifications to our timeline.

### Modification of Timeline

<b>Action</b>	<b>Who</b>	<b>Purpose/Details</b>	<b>When</b>
Writing of DoD Full Proposal  Faculty will write other research proposals to establish research programs for supplies, release time and student support	PI of grant	Building a Research Infrastructure for the Sciences at Bennett College	July 26, 2013
Notification of Grant.	From Department of Defense	Building a Research Infrastructure for the Sciences at Bennett College	January 15, 2014

Order equipment for Nutritional Food Science Laboratory	PI of grant	Order equipment. Equipment for Cell culture, the FTIR, HPLC, cryogenic tank will be housed in Pfeiffer Science 300 and gene expression equipment will be housed in Pfeiffer Science 201	Completed by the end of October 2014
Perform research project 1 on phytochemicals and breast cancer and research project 2 on Vitamin degradation using HPLC and FTIR spectroscopy	PI of grant and selected junior and senior biology students will perform research project 1; Key personnel and selected students will perform research on project 2 and project 3	During this time- there will be a 1 week orientation of the students on proper safety measures and use of equipment. The students will perform research full time and will have weekly lab meetings with PI and Key Personnel	May 2015-August 2015
Continued research with students	PI and students from summer research experiences	Students will conduct research for 10hrs/week and will have weekly discussions with mentor	August- December 2015
Development of the Introduction to Research Methods course	PI and other collaborators	Submission of syllabi to Curriculum Committee for Review	January- April 2015
Implementation of Introduction to Research Methods course	PI and other collaborators	Will examine research methodology of Quantitative Real Time PCR	Fall 2015 (August)
Peer Mentor Workshops with Undergraduate Students and Early/Middle College students	PI, trained undergraduate mentors and Early/Middle College High School students	Will examine the methodology of a Western Blot	August 2015
Workshops for Early/Middle College Teachers	PI and Early/Middle College Teachers	Strengthened science education	June 2015