National Academies of Science, Engineering and Medicine

The Impact of COVID-19 on Tenure Clocks, the Evaluation of Productivity, and Academic STEMM Career Trajectories for Women in STEMM

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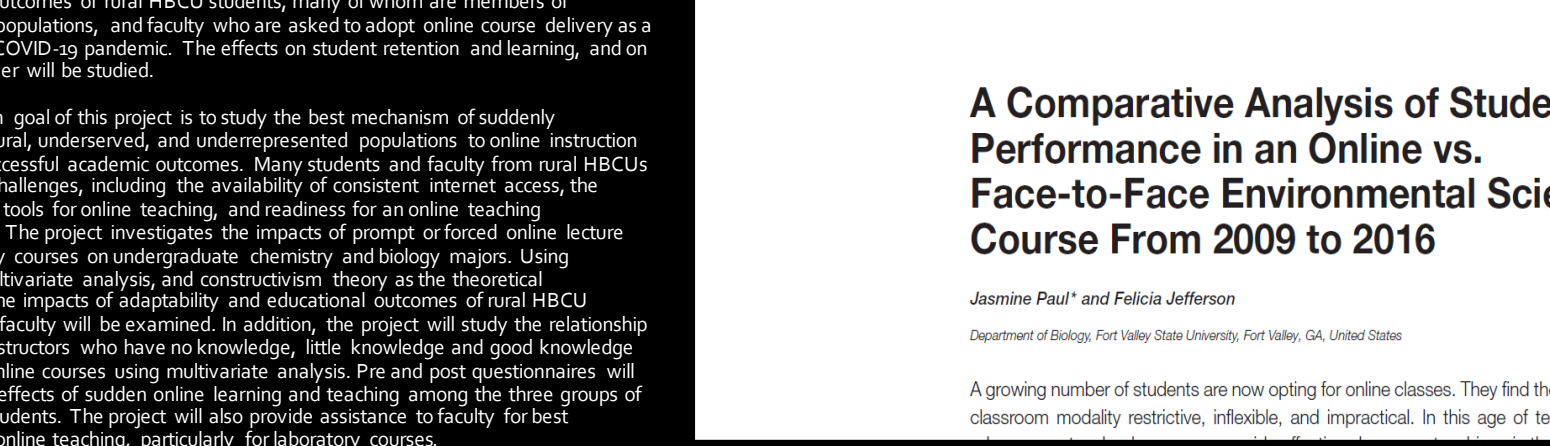
November 5, 2020

NSF RAPID COVID-19

The project at Fort Valley State University seeks to investigate the adaptability and educational outcomes of rural HBCU students, many of whom are members of underserved populations, and faculty who are asked to adopt online course delivery as a result of the COVID-19 pandemic. The effects on student retention and learning, and on faculty turnover will be studied.

The long-term goal of this project is to study the best mechanism of suddenly introducing rural, underserved, and underrepresented populations to online instruction leading to successful academic outcomes. Many students and faculty from rural HBCUs face unique challenges, including the availability of consistent internet access, the availability of tools for online teaching, and readiness for an online teaching environment. The project investigates the impacts of prompt or forced online lecture and laboratory courses on undergraduate chemistry and biology majors. Using Qualtrics, multivariate analysis, and constructivism theory as the theoretical framework, the impacts of adaptability and educational outcomes of rural HBCU students and faculty will be examined. In addition, the project will study the relationship among the instructors who have no knowledge, little knowledge and good knowledge in teaching online courses using multivariate analysis. Pre and post questionnaires will compare the effects of sudden online learning and teaching among the three groups of faculty and students. The project will also provide assistance to faculty for best practices for online teaching, particularly for laboratory courses.


frontiers in Computer Science

ORIGINAL RESEARCH
published: 12 November 2019
doi: 10.3389/fcomp.2019.00007

Check for updates

A Comparative Analysis of Student Performance in an Online vs. Face-to-Face Environmental Science Course From 2009 to 2016

Jasmine Paul and Felicia Jefferson*

Department of Biology, Fort Valley State University, Fort Valley, GA, United States

A growing number of students are now opting for online classes. They find the traditional classroom modality restrictive, inflexible, and impractical. In this age of technological

Citation: Paul J and Jefferson F (2019) A Comparative Analysis of Student Performance in an Online vs. Face-to-Face Environmental Science Course From 2009 to 2016. Front. Comput. Sci. 1:7. doi: 10.3389/fcomp.2019.00007

Researchers

Neuroscience, Biology, Engineering, and Sleep (NeuBEs) Laboratory (www.neubefvsu.com)

Faculty
- Dr. Felicia Jefferson, Director

Graduate Students (6)
- Co-Advisor to one Ph.D. and six (6) Master's Students at partnered labs

Undergraduate Students (9)
- *Majors/Minors:* Biology, Biotechnology, Chemistry, Nuclear Engineering
  1. Zakiyah Brannen-Buxton
  2. Amber Davenport
  3. Cassandra Gary-Smith
  4. Tracie Nicole Holmes
  5. Stephanie Johnson
  6. Myron Preston
  7. Jenish Smart
  8. Kebriana Ross
  9. Gabrielle van Genderen

Partnered LABS
- *Emory and Atlanta VA Center,*
- *University of Texas Arlington*
- *University of Texas Health Science Center*

Current Lab Projects: Smart Home tracking for home based elderly patients with Alzheimer's, Effects of Artificial Light at Night (ALAN) on Sleep-Wake Patterns in Rural and Suburban Wildlife, Electromagnetic radiation and bird migratory paths, Neurotoxicological effects of sleep deprivation and cognitive decline, RFID Rat/Pig Model for smart Pills, etc.

Effects of the Move to Online Teaching on the Rural HBCU Community due to the Coronavirus (COVID-19) Pandemic

NSF Award #2028573

Dr. Jasmine Paul,
Associate Professor,
Fort Valley State University, Fort Valley, GA 31030

Dr. Paul has significant experience in teaching online lab courses at Fort Valley State University. Dr. Paul also served as research mentor to several undergraduate students in research. Students are challenged to present oral and poster presentations at the Annual Biomedical Research Conferences (ABRCMS) and Annual National Institute of Science/ Beta Kappa Chi Scientific Honor Society each year. Dr. Paul's focus on the research is toward HIV/AIDs and Related Risk Behaviors among African American College Students. Her recent publication is on "A comparative Analysis of Student Performance in an Online vs Face to Face Environmental Science Course from 2009 to 2016" was on Frontiers Computer Science. In the year 2019. (doi.org/10.3389/f.comp).

Dr. Paul also collaborated with Dr. Jefferson to support the research on "The ability of a sleep intervention to increase non-STEM major's interest in STEM fields and their engagement in a STEM course based on sleep quality and /or duration. (ongoing research support). Currently Dr. Paul is working with Dr. Jefferson on the research "Effects of Coronavirus (COVID-19) on the Rural HBCU community with the move to 100% onli teaching. NSF.20-052,2020.

Dr. Felicia Jefferson

- Education: *Biotechnology (B.S.) and German Language (B.A.) - (RIT), Molecular Genetics and Biochemistry (M.S.) – (GSU), Neuroscience and Biomedical Science (Ph.D.) – (MSM), Behavioral Neuroscience Research Fellow (Postdoctoral) - (Emory)*
- Appointments: Industry Employment: Bausch & Lomb, Procter & Gamble, Schering-Plough (now Merck), American Management Association, *Positions:* Staff Scientist III, Staff Scientist V, Review Manager, Contributing Editor; Academic: Fort Valley State University, (Tenured Associate Professor Biology

Purpose of the Research

- Provide insights on how the COVID-19 pandemic on women, particularly in academic STEMM (Science, Technology, Engineering, Mathematics, and Medicine) has created challenges, that, if understood may reshape academia in the future.

- This talk specifically addresses challenges in:
  - STEMM job market,
  - Promotion, advancement, and tenure for faculty (tenure- and non-tenure-track), and
  - Productivity

Goal

- Understand the effects of time extensions , academic productivity, and intersectionality during pandemic to women in academia and identify opportunities to attenuate negative components of these effects.

Hypothesis

- We hypothesize that the COVID-19 pandemic will have more pronounced effects in the job market due to requested time extensions, productivity, and intersectionality for women.

Bloomberg Subscribe

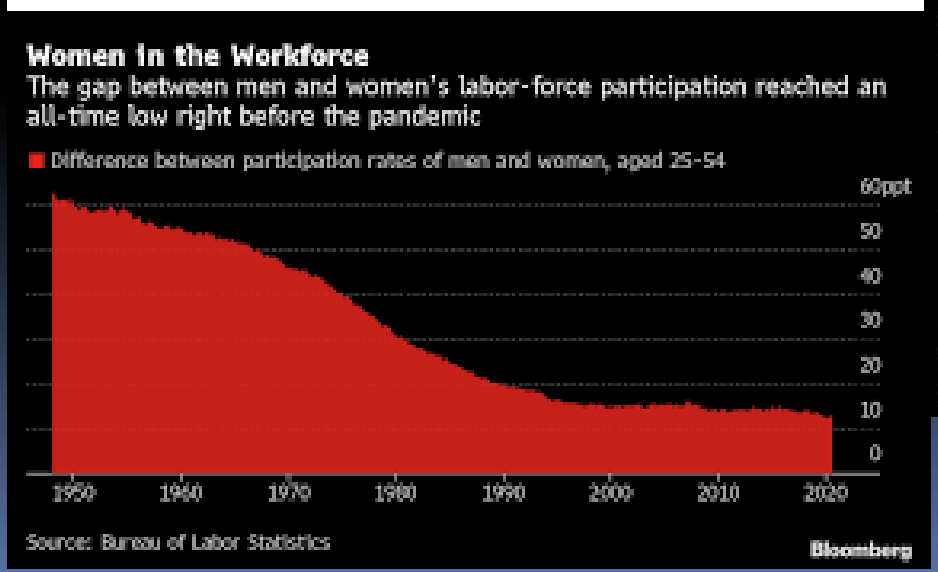
Economics

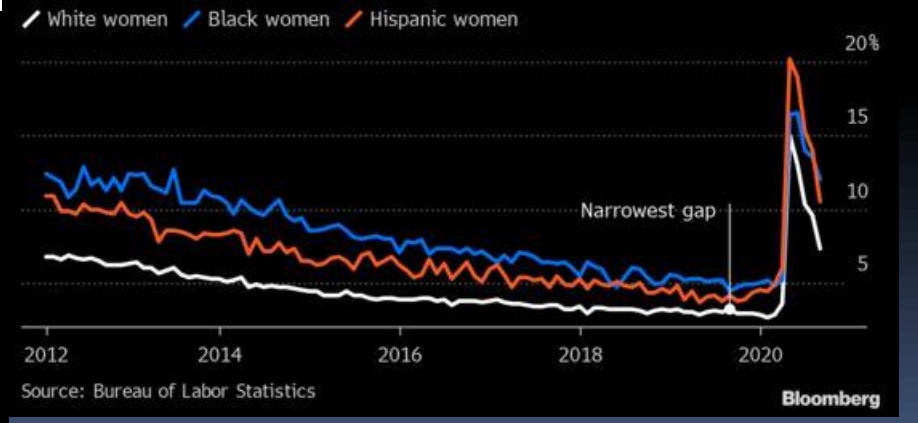
The First Female Recession Threatens to Wipe Out Decades of Progress for U.S. Women

The pandemic has erased years of economic gains for women and is poised to leave lasting economic scars

By Olivia Rockeman, Reade Pickert, and Catarina Saraiva
September 30, 2020, 5:00 AM EDT

Women helped pull the U.S. economy out of the last recession. This time around they are falling behind.





Reference: Rockeman, O; Pickert, R; Saraiva, C; *Bloomberg*, September 30, 2020

Specific Research Objectives

1) *Identify the impacts of time extensions for women in academe from graduate students, post docs, and all faculty levels NTT and TT.*
2) *Identify the impacts of academic productivity for women during the pandemic*
3) *Identify the impacts of the aforementioned (extensions and productivity) on women and faculty of color.*

Overview of the Selected Approach

- We hope to address important questions such as:
  - What are the current and longer term implications time extensions for women in academe from graduate students, post docs, and all faculty levels NTT and TT?
  - What are the impacts on academic productivity for women during the pandemic?
  - Also, given the current anti-racism movement contextualized through the Black Lives Matter Movement, what are the impacts of these activities for women and faculty of color?

Methodology

Data Collection/Sources

- Publications,
- Conferences,
- Credible news sources

- This research framework evaluates the areas of extensions, productivity, and intersectionality for women.
  - The STEMM career pipeline and workforce for women and minorities, particularly for women of color is also analyzed

Presentation Design

Area	Timeframe	Pipeline
Extensions	Relevant Past	Graduate Students
Productivity	Present – Current Findings	Postdoctoral fellows
Intersectionality	Future – Implications for the Future	Non-Tenure Track Faculty
	Relationship to Current Study	Tenure Track Faculty
		Administration

Highly Relevant Reference Sources

- **Hal Salzman, MA, PhD, Professor and Sociologist, Rutgers University***

  - H. Salzman, Bloomberg, August 4, 2020
  - **STEM performance and supply: assessing the evidence for education policy** (2019) (Hal Salzman and Beryl Lieff Benderly) Journal of Science Education and Technology 28(1): 9-25. https://doi.org/doi:10.7282/t3-7551-p083

- **Matthew Hora, Assistant Professor and Cultural Anthropologist and Educational Psychologist, University of Wisconsin***

  - Hora, M. T. (2019). Hiring as cultural gatekeeping into occupational communities: implications for higher education and student employability. Higher Education, 1-18.
  - Hora, M.T., Newman, R.Y., Hemp, R., Brandon, J. & Wu, Y. (2020). Re-framing student employability: From commodifying the self to supporting student, worker and societal well-being. Change: The Magazine of Higher Learning, 52 (1), 37-45.

- **Sabrina Pickens, PhD, MSN, GNP-BC, ANP-BC, Assistant Professor and Adult and Gerontological Nurse Practitioner, University of Texas Health Science Center at Houston***

- Beronda Montgomery, PhD, Professor and Interim Assistant Vice President Research & Innovation, Michigan State University
  - Planting Equity: Using What We Know to Cultivate Growth as a Plant Biology Community, *The Plant Cell*, 32: 11, Nov 2020
- Eve J. Higginbotham, SM, MD, Professor, Ophthalmology and Vice Dean for Inclusion and Diversity, University of Pennsylvania
  - The Influence of Gender and Underrepresented Minority Status on Medical Student Ranking of Residency Programs (A Agawu, et. al. - *Journal of the National Medical Association*, 2019
- Leslie D. Gonzales, Ed.D., Associate Professor, Michigan State University
  - Supporting Faculty During and After COVID-19 : Don't Let Go of Equity, ASPIRE
- Erick C. Jones, MS, PhD, PE, Fellow, ISEE, Endowed Professor, IMS Engineering and Associate Dean, University of Texas Arlington
  - Career Arcs, Action and Diversity in Engineering, 2017 ASEE, (EC Jones and Rebecca Bates)
  - Graduate Research Internships, Diverse, August 20, 2017

***Study collaborators**

Findings and Results

Extensions

Past: History of Academic Time Extensions and Women

- Academic clock extensions following maternity leave
- FMLA and benefit to women; benefit to women and men in academia

Present: Extensions during the COVID-19 Pandemic

- Academic clock extensions during the COVID-19 pandemic
  - Pipeline
    - Doctoral Students
    - Postdoctoral Fellows
    - Tenure Track
- Contractual effects
  - Non-Tenure Track
  - Administration

Extensions

Implications for the Future

- Academic clock extensions during the COVID-19 pandemic point to additional factors that should be considered Implications for academic job market of the pipeline (grad students, postdocs, NTT, TT, administrative)

Relation to the current study

- NTT faculty and grad students (spring 2020) – those who could effectively transition to online teaching more security; (fall 2020) not so much TT faculty "caught up"
- "Difficult" online transition (Spring 2020); Mainly experienced at Non-R1-HBCUs and HSIs, rural institutions, and primarily teaching institutions

Productivity

Past: Academic productivity during turbulent times

- Greater reduction in productivity experienced by women more than men

Present: Productivity during the COVID-19 Pandemic

- Early analyses suggest that female academics are posting fewer preprints and starting fewer research projects than their male peers. (Giuliana Viglione, Nature, May 20, 2020 and Andersen, J. P., Nielsen, M. W., Simone, N. L., Lewis, R. E. & Jagsi, R. Preprint at https://arxiv.org/abs/2005.06303 (2020)).

Productivity

Implications for the Future

- Policy changes in preparation for future times of turmoil
- Pipeline Issues Persist: "Only a third of all U.S. STEM degree holders are actually employed in STEM jobs." and Only half of PhD students who leave U.S. universities each year are in "'career jobs.'"– H. Salzman, Efinancial Careers, September 9, 2020 and *STEM Performance and Supply: Assessing the Evidence for Education Policy, 2019*

Relation to the current study

- Our research suggests that this reduction in productivity is seen most prominently in order during COVID-19

Intersectionality

Past: Academic Women and Impacts of Race, Motherhood, and Additional Intersectionality during turbulent times

- **<u>In order of institutions / population groups experiencing greatest reduction in academic scholarship productivity</u>**: faculty at Non-R1 institutions that are HBCUs, HSIs, primarily teaching institutions, rural institutions
- **Faculty** at the above institutions who are:
  - women (service - academic)
    - black
    - Latino
    - white
    - Asian
    - American
    - International
  - Women
    - Mothers (unmarried)
      - NTT
      - TT/Tenured
    - Mothers (married)
      - NTT
      - TT/Tenured

Present: Effects of Intersectionality during the COVID-19 Pandemic

- Reduction in productivity experienced most by academic women who are mothers - "The Mom Effect"
- The gender, race/ethnicity, and motherhood effects are more pronounced during this pandemic

Intersectionality

Implications for the Future

- Realities of American society should be incorporated into academia – we tend to do this for students and even for staff, but less for faculty
  - Work life balance policies in academia should be better incorporated at institutions.
- Focus on service – Shift in contractual obligations
  - Faculty populations completing the least service may be voluntold to complete more (this already works in some university systems)

Relation to the current study

- <u>During this pandemic</u>: Our research shows that there is a significantly greater burden experienced by black American faculty at HBCUs who, in addition to contracted faculty duties of teaching, research, and service, are managing a significantly higher student mental health burden due to the increased number of black American students' family members dying or becoming ill during this pandemic.
- Why black American faculty?
  - These are the faculty members that students on HBCU campuses (qualitative analysis) are seeking out for support (both academically and personally)
  - A similar pattern is being reported in our study for black American faculty at PWIs and R1 institutions.
- Black American women faculty are sought out the most

Challenges for Women and Faculty of Color at non-PWIs

- **In order of institutions / population groups experiencing greatest reduction in academic scholarship productivity**: faculty at Non-R1 institutions that are HBCUs, HSIs, primarily teaching institutions, rural institutions
- **Faculty** at the above institutions who are:
  - Women (service - academic)
    - black
    - Latino
    - white
    - Asian
    - American
    - International
  - Women
    - Mothers (unmarried)
      - NTT
      - TT/Tenured
    - Mothers (married)
      - NTT
      - TT/Tenured
  - Men - Black American

Challenges for Women and Faculty of Color at Rural Institutions during the COVID-19 pandemic

- Continuous student and faculty internet access (institution and home)
- The desire for in-person learning
- Use of masks

Technology Accelerators Good or Bad? (Extensions from the research)

- In the context the pipeline, it was clear that the technology enabler of online technology allowed GTAs and NTT faculty women to benefit through the online and hybrid delivery modes

Recommendations

Track the Data

(as we're doing)

- What evidence points to this?
  - Data collection and analysis leads to solutions (STEMM)

- Economically "unique" situations for women during this pandemic
- Home life "unique" experience for STEMM population, particularly women and families

Recommendations

Trusted faculty Mentorship and Faculty Reintegration Training

- What evidence points to this?
  - Previous data examining turbulent times, studies examining reentry into academia and academic research
- For faculty not receiving this, additional time may be lost during return following pandemic
- Under conditions where such mentorship and training is not received, instead of clock extensions consideration of reduction in P and T requirements should be made

Recommendations

Anti - Micro aggression

training for faculty, staff, and students (would be idea)

Diversity, Equity, and Inclusion Commitment of institutions by the numbers

(Action Item)

- What evidence points to this?
  - Previous data examining unconscious bias in academia and academic research, academic workforce hiring and grant funding bias, and teaching evaluations for women (TT, NTT, GTAs)
- Institutions whose faculty population do not match that of the student population should implement proposed DEI commitments by recruitment of more faculty that do reflect the student population (in the majority of studies cases this includes women and black and Latino faculty in STEMM)

Limitations of the study

- We sought specifically publications, conferences, credible news sources as our primary data collection approach. We utilized the data collected from current ongoing research studies by the authors as an initial validation of these trends.
- We were able to locate quite a few op-ed publication pieces during this time, however, we are careful to confirm that these findings meet the highest standards for reliability, including detail to journal history of peer-review publication, academic notoriety, and impact factor.

Conclusions

- We do believe the results have merit in moving forward institutions to support further inquiry about this important topic and lead to more inclusive policies and other research to push diversity, equity, and inclusion forward.

Acknowledgements

- National Academies of Science, Engineering and Medicine

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QUESTIONS?

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Biology Department, College of Arts & Sciences,
Fort Valley State University

November 5, 2020

APPENDECIES

Transitioning to 100% online teaching

- Challenges on student's rapid online courses
- Time management.

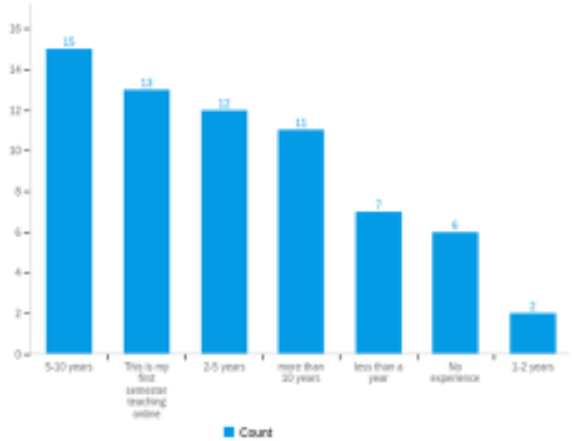
To mitigate the level of stress involved with this transition

a. Communication-primary component in any teacher/student interaction
b. Simple Instructions
c. Resourcefulness- important component for Instructor-created lecture notes/labs
d. Synchronization of the course learning objectives and the plans of the instructor-created labs is essential
e. Adaptability –freedom in revising a lab
f. Versatility -virtual labs allow the students to conduct their work in a variety of ways-open resources.

Faculty and Student Survey Results June 2020

Faculty Survey

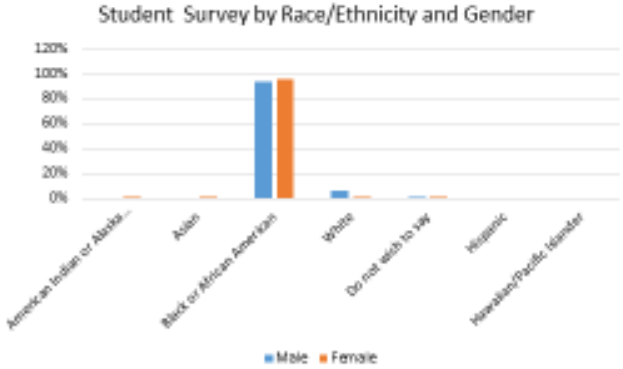
Category	Percentage	Count
less than a year	10.61%	7
No experience	9.09%	6
This is my first semest	19.70%	13
1-2 years	3.03%	2
2-5 years	18.18%	12
5-10 years	22.73%	15



Online Teaching Experience Descriptive Statistics					
Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	7	4.44	1.98	3.91	66

Student Survey

Race/Ethnicity	Male	Female
American Indian or Alaska Native	0.0%	0.4%
Asian	0.0%	1.1%
Black or African American	93.1%	95.7%
White	5.7%	1.4%
Do not wish to say	1.1%	1.4%
Hispanic	0.0%	0.0%
Hawaiian/Pacific Islander	0.0%	0.0%



Student Race/Ethnicity Descriptive Analysis					
Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	5	3.04	0.31	0.1	366

*June 2020 was the month after we received NSF funding
*Quite a few of the respondents had been teaching for 5+ years, but not a significant number
*The faculty who did respond had taught an average of 4 online courses before.

Let us know if you're interested in participating

Contact: jeffersonf@fvsu.edu and paulj@fvsu.edu

- Universities we are working with:
  - *Bluefield State College*
  - *Chaflin University*
  - *Elizabeth City State University*
  - *Grambling State University*
  - *Kentucky State University*
  - *Louisiana State University*
  - *Mississippi Valley State University*
  - *Morehouse School of Medicine*
  - *Prairie View A&M University*
  - *Rust College*
  - *Selma University*
  - *South Carolina State University*
  - *Southwestern Christian College*
  - *Talladega College*
  - *Tuskegee University*
  - *University of Maryland Eastern Shore*
  - *University of Texas Arlington*
  - *University of Virgin Islands*
  - *Voorhees College*
  - *Wiley College*