

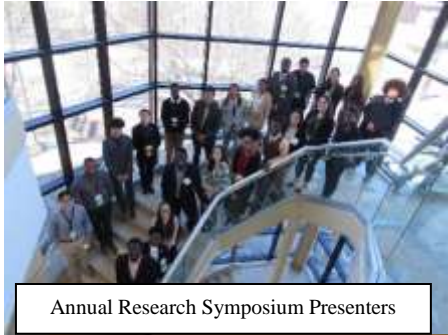
2020 Annual Report

Kentucky-West Virginia
Louis Stokes Alliance for
Minority Participation
(KY-WV LSAMP)



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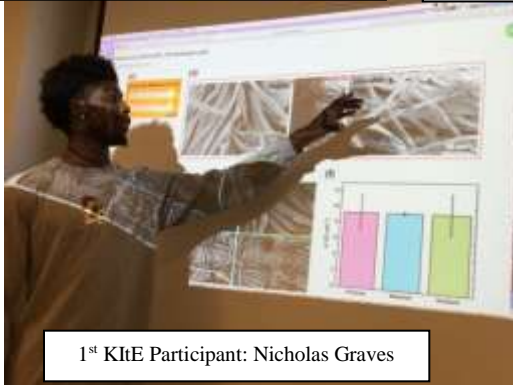
Annual Research Symposium Presenters



Dr. Astrid Suarez – Symposium Keynote



Mike Hepler – Symposium Plenary Speaker



1st KItE Participant: Nicholas Graves



2019 GEM Grad Lab
University of Tennessee, Knoxville



WVU Scholars



Charlene Walker at Alliance Retreat



Women of Color STEM Conference

Kentucky-West Virginia Louis Stokes Alliance for Minority Participation

2020 Annual Report

Kentucky – West Virginia
Louis Stokes Alliance for Minority Participation
In Science, Technology, Engineering, and Mathematics
(KY-WV LSAMP STEM)

Submitted by

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INTRODUCTION

The Kentucky-West Virginia Louis Stokes Alliance for Minority Participation program (KY-WV LSAMP) is a ten-institution alliance led by the University of Kentucky. Alliance members include: Bluegrass Community and Technical College (BCTC), Centre College, Jefferson Community and Technical College (JCTC), Kentucky State University (KSU), Marshall University, University of Kentucky (UK), University of Louisville (UofL), West Virginia State University (WVSU), West Virginia University (WVU), and Western Kentucky University (WKU). Alliance goals are to create, enhance, and expand programs designed to broaden participation and increase the quality and quantity of students from underrepresented populations who receive degrees in science, technology, engineering, and mathematics (STEM) disciplines. The alliance projects the following key outcomes for the third funding period (2018-2023): increase URM STEM BS degrees at alliance institutions for a total of 1,900 BS STEM degrees over five years. This will be accomplished by achieving increases in total alliance enrollments to 2,800 average annually with similar increases in retention, transfer rate, and graduation rates. These increases will contribute to increases in application to and attendance in STEM graduate degree programs.

Each institution has developed programs consistent with LSAMP goals. Institutions have also, with the help of LSAMP, built sustainable partnerships within campus programs as well as with external (outreach) programs and organizations. Program activities and partnership resources focus on outreach and recruiting, peer mentoring, undergraduate research experiences, research presentation opportunities, summer bridge and transitional programs for entering students, curriculum reforms in “gatekeeper” courses, international experiences, and workshops on professional development and STEM career options.

The **intellectual merit** of the program is the increased knowledge base related to teaching and learning practices for underrepresented students in STEM disciplines, practices for improved recruiting and retention, and the development of improved curriculum materials and practices for STEM disciplines. As Scholars pursue their degrees and participate in program activities, they develop the skills needed to succeed not only in their degree programs, but also in the professional community of their chosen field. They learn the skills necessary to be the leaders and experts. Scholars give and receive mentoring on multiple levels from middle school and high school students to world-renowned researchers. In addition to increasing their knowledge and research skills, this multi-level mentoring also helps the Scholars to build excellent professional networks for current and future research, presentation, educational and professional opportunities. Often, the connections made through the LSAMP program guide Scholars to the next opportunity.

The **broader impact** is the increase in URM STEM BS degree production. This will broaden math, science, and engineering participation of underrepresented students from the two Established Program to Stimulate Competitive Research (EPSCoR) states and surrounding regions. Because of the skills developed and the connections made through LSAMP, Scholars are uniquely qualified for graduate programs and industry. Once they have received their BS degrees, many participants continue into graduate programs. This will increase the diversification of the STEM workforce and broaden the participation of underrepresented students who seek and earn graduate degrees.

The increase in skilled workforce has the potential to significantly improve the competitive position of the two states and eventually to improve faculty diversity in STEM fields. In turn, participants will play key roles in educating their respective communities about STEM fields and encouraging younger students to pursue STEM disciplines. The multi-level mentoring gives Scholars a venue for serving as role models for future generations.

September 2018, KY-WV LSAMP received funding to continue the program. There have been many successes as well as some continued challenges and trials in 2019-20. The most significant differences for the third cycle of funding include adding Jefferson Community and Technical College to the alliance, and KY-WV LSAMP now qualifies to submit proposals for Bridge to the Doctorate funding. May 2020, KY-WV LSAMP was

officially awarded funding for the first Bridge to the Doctorate cohort in the alliance. Beginning Fall 2020, the KY-WV LSAMP will support graduate students in STEM fields at the University of Kentucky. Progress continues to be made to increase the number and credentials of students from underrepresented populations who receive degrees in science, technology, engineering, and mathematics disciplines.

PROGRAM GOALS AND MEASURABLE OBJECTIVES

The Kentucky-West Virginia Louis Stokes Alliance for Minority Participation consists of ten colleges and universities. Of these, there are comprehensive research universities, two historically black college and universities (HBCU), regional universities, and two 2-year colleges. Using knowledge learned from past successes paired with lessons learned from past shortcomings, the alliance will continue to increase the number of students from underrepresented populations who receive degrees in science, technology, engineering, and mathematics disciplines.

In order to meet program goals of increasing URM STEM enrollments and degrees, KY-WV LSAMP must strive to increase the number of students who participate in program activities and receive program benefits. The increase in program participants (Scholars) should result in a ripple effect that increases the number of students earning STEM degrees not only at the partner institutions, but throughout the entire region including all of West Virginia and Kentucky. This is demonstrated in Figure 1. **Directly Funded Scholars** receive direct LSAMP financial support (such as stipends, tuition aid, textbooks, conference travel, etc.) *and* participate in program activities. **Unfunded Scholars** do not receive direct LSAMP financial support but are documented as being accepted into the program *and* participating in program activities. **Non-Scholar Participants** have not been formally accepted into the program *and* participate in one or more program activities (such as attending Scholar Meetings or research symposia). **Influenced Students** have no direct connection or communication with program staff or participation in program activities but may be influenced and/or mentored by friends and/or family who do. The ending result is an increase in URM, STEM, and undergraduate research programs and participants throughout the alliance and the region.

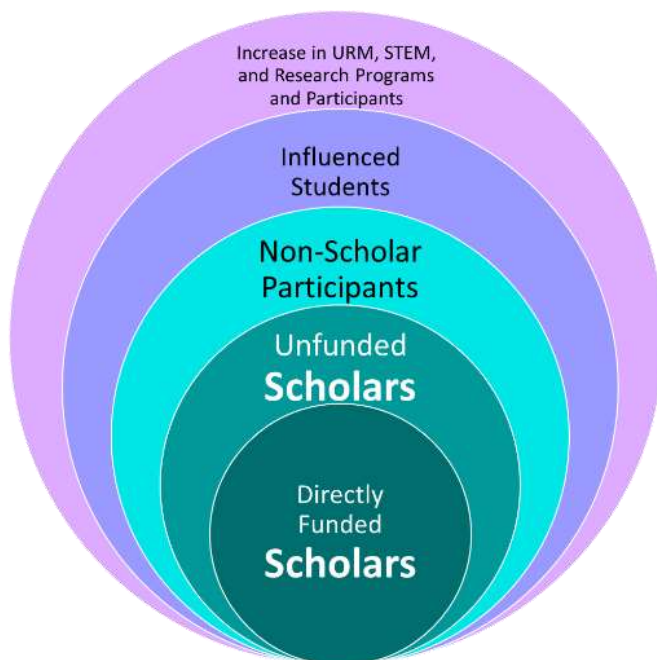


Figure 1: Graphic Representation of the KY-WV LSAMP Ripple Effect

Projected Outcome One

To increase URM STEM BS degrees to an average of 380 per year for a total of at least 1,900 degrees over five years.

In 2018-19, 416 URM STEM BS degrees were granted by KY-WV LSAMP institutions. This is an 11% increase from the previous year and a 140% increase from the baseline year (173 degrees in 2006-07). The Alliance granted 1552 URM STEM bachelor's degrees during the second cycle funding period. This met that proposed goal of 1000 degrees and is progress for the current funding period. Figure 2 shows the number of degrees from 2006-07 to 2017-18. Overall, there have been 3,215 URM STEM bachelor's degrees granted at KY-WV LSAMP institutions since 2006. In addition, when exploring degrees by ethnicity, it is clear there has been a significant increase in degrees granted to African Americans, Hispanics, and students of more than one race. Figure 3 shows the breakdown of URM STEM bachelor's degrees granted by KY-WV LSAMP institutions by ethnicity.

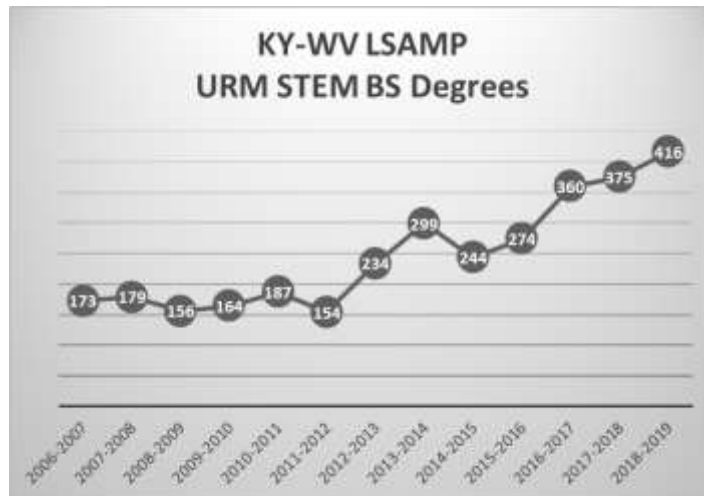


Figure 2: URM STEM BS Degrees Granted at KY-WV LSAMP Institutions

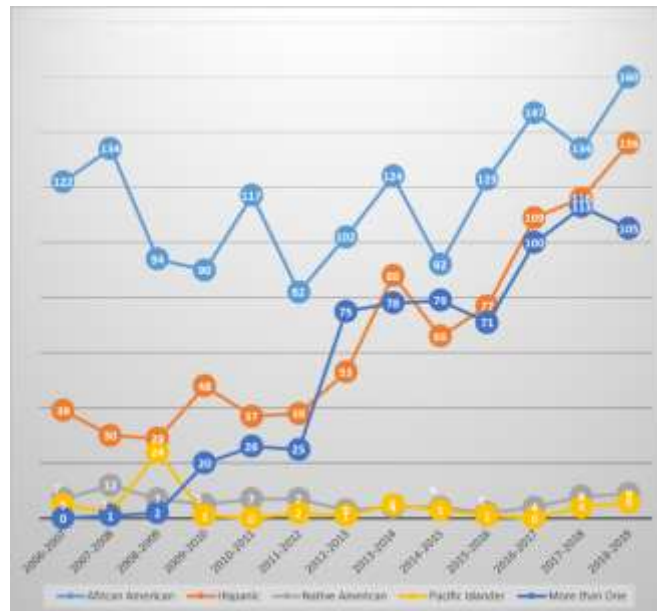


Figure 3: URM STEM BS Degrees Granted by Ethnicity

Projected Outcome Two

To increase URM STEM enrollments to an average of 2,800 per year.

Traditionally, underrepresented (URM) populations targeted by the national LSAMP program (African American, Hispanic, Native American, and Pacific Islanders) represent an almost unique recruiting challenge for the KY-WV LSAMP institutions because of their unusually low percentages of the populations of the two states. Even though the URM population accounted for over 26% of the US population, they comprise only 16% and 6%* of the population in Kentucky and West Virginia, respectively. This continues to be a challenge to recruiting students. * Source of URM population data: Kaiser Family Foundation estimates based on the Census Bureau's March 2015 Current Population Survey (CPS: Annual Social and Economic Supplement).

Even with this challenge, the KY-WV LSAMP has been successful in increasing enrollments. In 2018-19, there were 2,530 URM students enrolled in STEM bachelor degree programs at KY-WV LSAMP institutions. This is an 8% decrease from the previous year but still a 32% increase from 2006/07. The second funding period average enrollment totaled 2,394 per year. This met the goal of 2,000 per year average for the second funding period. We expect to meet the third funding cycle goal of 2,800 per year. Figure 4 shows the number of URM STEM enrollments at KY-WV LSAMP institutions since 2006. Figure 5 shows the breakdown of URM STEM enrollments by ethnicity. Note: there was a decrease in the number of African Americans but an increase in the number of Hispanics who enrolled in STEM programs at KY-WV LSAMP institutions.

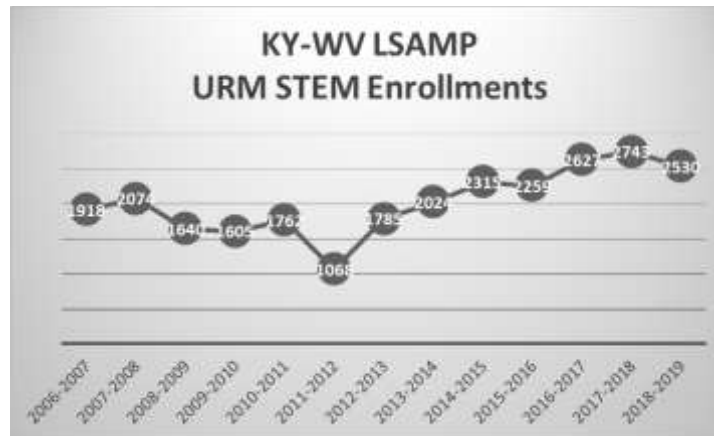


Figure 4: URM STEM Enrollments at KY-WV LSAMP Institutions

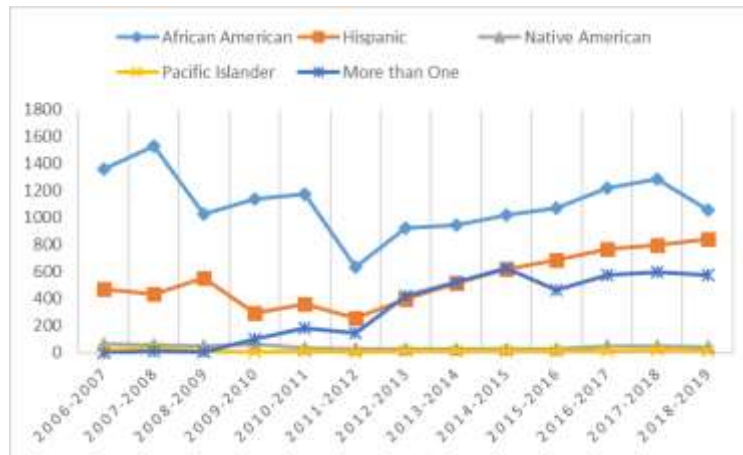


Figure 5: URM STEM Enrollments by Ethnicity

Projected Outcome Three

To have at least 50% of graduating LSAMP Scholars be accepted to graduate programs.

Preliminary data indicates there were 45 KY-WV LSAMP participants who graduated with STEM bachelor degrees in 2019-20. Of those, 23 (51%) are pursuing graduate and/or professional degrees. This meets the goal of having at least 50% of graduating participants pursuing advanced degrees.

Projected Outcome Four

To increase the percentage of LSAMP Scholars who conduct academic-year research.

Studies have shown that students who conduct research receive a significant confidence boost, a greater sense of accomplishment, a closer relationship with the faculty mentor, and are more likely to persist through to graduation. The act of research allows students to apply lessons learned in the classroom, thus increasing academic success. KY-WV LSAMP Scholars are highly involved in research projects. Many Scholars participated in research during the academic year, and some conducted research during a summer internship. Some Scholars may be provided an LSAMP stipend for conducting research with a faculty mentor. Other Scholars are paid as undergraduate research assistants by their mentor and/or department. Still others participate in co-op or other university or industry research opportunities. Centre, Marshall, UK, UofL, WVSU, WVU, and WKU have opportunities for research on their campuses. KSU has relationships with other universities and organizations to provide KY-WV LSAMP Scholars with research experiences. BCTC and JCTC are building a network of opportunities at nearby campuses such as UK and UofL and preparing Scholars for summer experiences. According to preliminary data, there were 336 participants at the ten institutions in 2019-20. Of those, 53 (16%) conducted research during the academic year. This is about the same percentage as the previous year. Though there was not an increase, due to COVID-19, Spring 2020 held more obstacles than normal for undergraduates who are interested in conducting research during the academic year. Some of those obstacles are expected to remain for Fall 2020, but there are also some opportunities that are presenting themselves. KY-WV LSAMP will play a vital role in helping undergraduates find and take advantage of those opportunities.

Projected Outcome Five

To increase the percentage of LSAMP Scholars who participate in full-summer internship experiences

KY-WV LSAMP Scholars are provided opportunities to conduct research during the summer. Some alliance campuses have allocated LSAMP funds to support Scholars to conduct research on their home campus during the summer. Furthermore, KY-WV LSAMP Scholars are informed of and assisted with applying for summer experiences such as Research Experiences for Undergraduates (REU) programs, other college/university programs, national lab opportunities, and industry internships.

In summer 2019, 53 (16%) Scholars participated in full summer internships. This was a decrease from the previous year. However, it will serve as the baseline for the funding period. Examples of 2019 experiences in which KY-WV LSAMP Scholars participated in summer research included the first KY-WV LSAMP Scholar who participated in the new Knowledge Independence through Externship (KIte) initiative. Nicholas Graves, UK, conducted research under the mentorship of Dr. Trisha Andrews at the University of Massachusetts, Amherst. Four scholars conducted research in France during summer 2019. Of those, one participated in the

Louisiana State University France iREU, and three conducted research as a direct collaboration that resulted from a past LSU France iREU participant. Summer 2020, presented a large challenge for KY-WV LSAMP participants as well as millions of students across the country. Because of the COVID-19 pandemic, many summer internships and experiences were either cancelled or shifted to part-time and/or virtual experiences. Even with those challenges, some internships were transitioned to virtual rather than in person experiences. Other students were able to take advantage of webinars and virtual training opportunities to help them develop their professional skills and self-reflect on their career goals and aspirations. The exact number and extent of the impact is yet to be determined.

Projected Outcome Six

To increase the number of documented conference presentations by LSAMP Scholars to an average of 100 per year.

Giving presentations, especially research presentations, is a skill that can and should be developed for today’s STEM professionals. For that reason, KY-WV LSAMP encourages (and in some cases, requires) and supports Scholar presentations at local, state, and national conferences and symposia. This goal was also impacted by the COVID-19 pandemic. Though many scholars presented in summer and fall as well as early spring, late spring events (including local, state, and national conferences) were cancelled or migrated to virtual format. That being said, in 2019-20, KY-WV LSAMP participants made 100 documented presentations – meeting the goal of 100 per year. This number is considered preliminary as COVID-19 affected the collection of presentation data as well as the conferences themselves. The number of presentations documented includes 11 abstracts that were accepted for national presentation at cancelled events. Conferences at which presentations were made included, but were not limited to: the Kentucky Academy of Sciences Annual Meeting, West Virginia Research Day at the Capitol, the KY-WV LSAMP Annual Research Symposium, and the Society for the Advancement of Chicanos and Native Americans in Science. Table 1 shows the breakdown of presentations by institution and type. Table 2 shows a comparison of presentations by academic year. It is clear to see the number of presentations is rising. In addition, though there are not presentation opportunities at the Women of Color STEM Conference nor the Black Engineer of the Year Award (BEYA) Conference, they are excellent professional development opportunities. Forty-two Scholars and many other students attended these events in 2019-20.

Table 1: Number of Presentations Made by KY-WV LSAMP Scholars by Type and Institution

	Local	State/Regional	National	International	TOTAL
BCTC	0	0	0	0	0
Centre	9	2	2	0	13
JCTC	0	1	0	0	1
KSU	0	3	2	0	5
Marshall	0	2	0	0	2
UK	3	4	9	0	16
UofL	2	3	1	0	6
WVSU	0	3	1	0	4
WVU	10	16	5	0	31
WKU	5	10	7	0	20
TOTAL	29	44	27	0	100

Table 2: Comparison of Presentations by Academic Year

BY TYPE	2015-16	2016-17	2017-18	2018-19	2019-20	TOTAL
Local	8	11	20	35	29	103
State/Regional	32	26	29	61	44	192
National	11	10	20	15	27	83
International	0	2	6	3	0	11
TOTAL Presentations	51	49	75	114	100	389
Non-Present Nat'l	0	13	31	59	42	145

Projected Outcome Seven

To have at least five LSAMP Scholars per year who participate in international research experiences.

In 2017, **Sarah Hodges**, UK graduate, conducted research in Grenoble, France as a participant of the Louisiana international Research Experience for Undergraduates (iREU) program. Through her experience in planning her travel, she developed a checklist for international research travel. This document will help countless future Scholars in planning for and taking advantage of international experiences. Her checklist has already been utilized and updated several times.

In 2018-19, two KY-WV LSAMP Scholars participated in academic year study abroad experiences. During the course of those experiences, they also conducted research in the host country. Je’Coya Moore (Centre) traveled to China, and Scott Lopez (WVU) traveled to Japan thanks to a Boren Scholarship.

In summer 2019, five Scholars participated in international research experiences such as REU programs. Those include:

- Lloyd Bartley, UofL, France, LSU iREU
- Charles “Carlos” Beasley, UK, France, UK Broadening Participation in Engineering (BPE) Program
- Noela Botaka, UofL, Belgium, Fulbright Research Award
- Victor Holness, UK, France, UK BPE Program
- Darian Parker, UK, France, UK BPE Program

The Scholars conducting research in France through the UK BPE Program are as a direct result of collaborations a KY-WV LSAMP research mentor (Dr. Eduardo Santillan-Jimenez) built because of his LSAMP mentee’s participation in the France REU in Summer 2017. That year, in addition to the support provided to Sarah Hodges, the iREU selected Dr. Santillan for a \$5,000 faculty award to build collaborations and provide support for conference travel.

Projected Outcome Eight

To increase the average GPA of LSAMP Scholars from 3.1 to 3.3 by year five (2022-23).

The average GPA of KY-WV LSAMP participants for 2018-19 was 2.79. Table 3 shows the average GPA for participants including the first year of the program (2006-07), the lowest year on record (2007-08), and the first year of the current cycle (2018-19). GPA for 2019-20 is not, yet, available. Admittedly, this project goal has received little focused attention. However, there has been focused attention on providing academic assistance such as tutoring to participants in need of it. Participant GPA will be a topic of the 2020 Alliance Retreat.

Table 3: GPA Distribution and Averages

Participant GPA	2006-2007		2007-2008		2014-2015		2015-2016		2016-2017		2017-2018		2018-2019	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Less Than 2.0	3	3%	22	12%	2	1%	5	2%	12	4%	64	23%	43	11%
2.0 to Less Than 3.0	19	22%	62	34%	57	35%	91	40%	99	35%	69	25%	111	29%
3.0 and Higher	64	74%	99	54%	103	64%	132	58%	175	61%	147	53%	224	59%
TOTAL Scholars	86		183		162		228		286		280		378	
Average GPA	3.21		2.77		3.14		3.10		3.09		2.90		2.79	

Projected Outcome Nine

To increase the number of LSAMP Scholars by at least 5% each year for a minimum of 319 participants in year five (2022-23).

Preliminary data for 2018-19 showed that KY-WV LSAMP supported 281 Scholars at the ten institutions. Official participant data submitted to WebAMP was considerably higher - 378. The difference will be a topic of discussion at the 2020 Alliance Retreat. Preliminary data for 2019-20 shows the program supported 336 scholars. Figure 6 shows the number of KY-WV LSAMP participants each year.

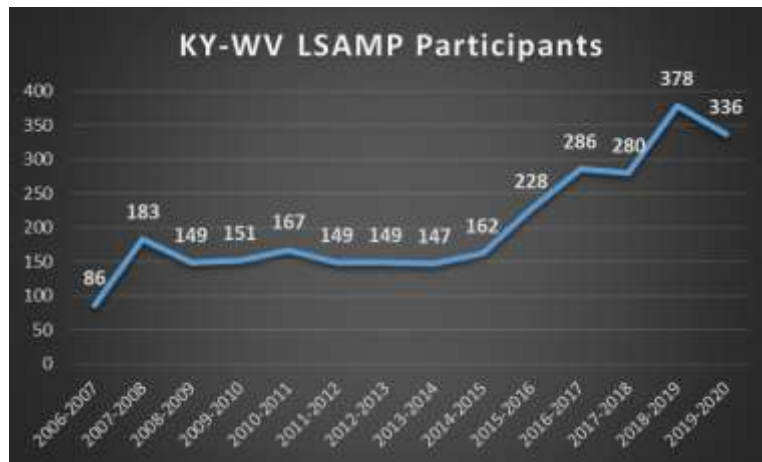


Figure 6: Number of KY-WV LSAMP Participants by Year

PROPOSED ACTIVITIES

Scholar Activities

Response to COVID-19

During the spring 2020 semester, the world changed... Many college campuses transitioned into online only classes. Faculty and staff had to quickly adapt classes and programming to virtual rather than in-person implementation. KY-WV LSAMP is no different. Some of the changes include, but are not limited to:

- BCTC continued offering tutoring through remote methods. Workshops were cancelled. LSAMP staff remained connected to participants via email and phone.
- Centre transitioned the RICE (Research, Internships, Creative Endeavors) Symposium to a virtual format – student presentations were recorded and made available to viewers online.
- JCTC had to cancel many spring activities.
- KSU transitioned PLTL to a virtual format. In an effort to increase scholar interaction, the PLTL cohort was subdivided into several mini groups for the virtual media. Scholars were responsible for self-reporting their PLTL hours and worked through their designated peer leaders. Several scholars also had connectivity and connection issues. In addition, most (if not all) the scholars will not have the opportunity to conduct research during summer 2020. An attempt is being made to engage several LSAMP scholars through virtual research projects in attempt to keep them focused on their STEM career plans.
- Marshall transitioned meetings to webhosted rather than in person. They continued to communicate with program participants via phone calls and emails.
- UK transitioned meetings to virtual. In addition, as the lead institution, UK is exploring and planning summer sessions. Since many summer experiences for scholars have been cancelled, KY-WV LSAMP is hoping to have research focused professional development to keep scholars active in developing their skills and knowledge as well as continue to progress in their career path decisions. KY-WV LSAMP is also working with the Louis Stokes Midwest Regional Center for Excellence (LSMRCE). Fara Williams is serving on the planning committee to develop summer professional development webinars. These events will occur about once a week. As dates are set, the webinars from both KY-WV LSAMP and LSMRCE will be promoted across the alliance.
- UofL transitioned meetings to virtual format to enhance scholar interaction. Many of the summer research opportunities were canceled.
- WVSU transitioned to on-line classes. Several students that were working in the lab were no longer able to do so. They were able to work from home on their classes. The annual spring symposium was canceled. Students participating in Research Rookies created virtual presentations to take the place of their poster presentations. Changes will also be made to summer programming.
- WVU had to end monthly meetings for the spring semester. There was also a decrease in the number of summer undergraduate research participants that could be funded.

KY-WV LSAMP Annual Research Symposium

The KY-WV LSAMP 12th Annual Research Symposium was held February 28-29, 2020. Activities held on Friday were for LSAMP participants only. Sessions for the Scholars focused on the graduate school application process. Mike Heppler, graduate school expert, spoke about the parts of graduate school applications and provided information on how Scholars can best represent themselves in the application documents. Mr. Heppler was followed by a panel of current graduate school students. The diverse panel included: a first-year, full-time MS student; a LSAMP staff person who is also a MS student; an industry professional who is pursuing her MBA while working full-time, a fourth-year Ph.D. student, and a student who was only months away from completing her Ph.D. Friday sessions were attended by 157 people including 122 undergraduates and 9 faculty. Saturday

sessions were open to the general public and were attended by 176 people including 117 undergraduates, 15 faculty, and 16 high school students. Sessions included recruitment tables as well as 31 poster presentations and three oral presentations made by Scholars. Astrid Suarez, Ph.D. (Analysis Branch Chief for the Meteorological Modeling and Analysis Mission at the Air Force Technical Applications Center) presented the keynote address. Dr. Suarez talked about her experiences as an undergraduate, the opportunities provided to her by the LSAMP program, and her research projects and career path.

Scholars who presented were:

Oral Presentations

Clayton	Bell	Centre
Gustavo	Camargo Silva	WKU
Scott	Lopez	WVU

Poster Presentations

Madewa	Adeniyi	WVU	Brandon	Weathers	JCTC
Asahel	Aguilar-Ortiz	UK			
Malik	Appleton	UK			
Koji	Barnaby	WKU			
Samantha	Belcher	WVSU			
Fransisco	Beltran	UK			
Micai	Benford	Centre			
Jaqueline	Brown	Marshall			
Diego	Cabanillas	WVU			
Arrah	Calvin	WKU			
Jacob	Clay	UK			
Mikayla	Dematrakis	UofL			
Shannon	Derkson	UofL			
David	Fowler	KSU			
Joshua	Hernandez	WVU			
Annalisa	Huckaby	WVU			
Jonathan	Kingsly	WVU			
Olivia	Lim	WVSU			
Zedan	Martin	WVSU			
Corey	Mattic Jr.	KSU			
Caitlin	Mickles	WVU			
Emma	Moore	WKU			
DeAnthony	Morris	WVU			
Lucas	Negron	Gatton			
Ephraim	Otieno	UofL			
Oriana	Ovide	WVU			
Katelyn	Ramsey	WVU			
Derek	Roberts	KSU			
Ishita	Sharma	Marshall			
David	Suarez	WKU			
Mya	Vannoy	WVU			
Alyse	Washington	WVU			

Table 4 shows a comparison of symposium attendees. The cover of the program, event agenda, and photos can be found in Appendix A. The program book (in its entirety) can be found on the KY-WV LSAMP website on the Alliance Activities page.

Table 4: Number of Symposium Attendees

	Faculty	Staff	Graduate Students	Undergrad Students	K-12 Students	Other	TOTAL
2016 Saturday	15	11	1	27	0	5	59
2017 Friday	8	9	4	43	0	2	66
2017 Saturday	17	14	8	50	0	4	93
2018 Friday	10	9	3	74	0	1	97
2018 Saturday	13	9	2	84	2	2	112
2019 Friday	14	14	5	93	1	2	129
2019 Saturday	18	17	3	94	43	4	179
2020 Friday	9	10	5	122	7	4	157
2020 Saturday	15	15	3	117	16	10	176

K-12 mentoring and connections.

Many alliance campuses participate in recruitment events. Several BCTC activities (such as Super Someday) focus on high school recruitment. Several campuses have enhanced LSAMP activities with connections to local K-12 institutions and organizations. Some examples include:

- Since 2017, BCTC’s Super Someday has specifically targeted STEM majors/careers.
- UK has increased its connections with the NerdSquad in Lexington. LSAMP Scholars have served as volunteers for this organization, and the founder, Cagney “CC” Coomer has mentored LSAMP Scholars.
- The KY-WV LSAMP project director is Co-PI on a grant through the National Institutes of Health. The STEM Through Authentic Research Training (START) Program provides opportunities for high school students to conduct research on the University of Kentucky campus during the summer. LSAMP Scholars will serve as undergraduate mentors for the high school students. Unfortunately, summer 2020 was to be the inaugural experiences in the program. Activities have had to be adjusted or postponed since many research labs are closed or have reduced access.
- KY-WV LSAMP has connected with a new K-8 STEM school for girls. *Fayette County Public Schools will launch the new Girls STEM School in 2020-21 -- confident that supporting girls in science, technology, engineering, and math in their formative years will build their confidence to more eagerly embrace these career pathways. The magnet school, which will first be housed in the former Linlee Elementary at 2420 Spurr Rd., will initially welcome 150 students in grades K-2 and then add a level every year through eighth grade. The program will cultivate an environment where girls are encouraged to indulge their STEM interests through fun, accessible, and interactive project-based learning. Districtwide bus transportation will be available, and after-school programs are in development. The district uses a weighted lottery to ensure that 50 percent of the students accepted are economically disadvantaged girls of color.* <https://www.fcps.net/girlsstem>
- In Lexington, UK LSAMP continues to collaborate with the STEAM Academy – LSAMP Scholars as well as staff serve as mentors for high school students who have an interest in STEM degrees and/or careers.

Bridge programs for academic preparation.

Many students begin their academic career at a community college for a number of reasons including financial considerations. Community colleges throughout the country play a critical role for students who intend to, eventually, complete a bachelor's degree, particularly in STEM fields. The KY-WV LSAMP alliance fully recognizes the importance of working with community colleges in creating a STEM pipeline for partnering colleges and universities. KY-WV LSAMP will work closely with both partner community colleges as well as others in the region to enhance the STEM pipeline.

The transfer activities for KY-WV LSAMP include three aspects.

- 1) Direct LSAMP programming.** Bluegrass Community and Technical College (BCTC) has been a partner institution since the inception of KY-WV LSAMP. Now, Jefferson Community and Technical College (JCTC) has also become a partner in the alliance. The addition of JCTC is important because of their large URM student population.
- 2) Alliance institution programming.** Though not directly funded by LSAMP, BCTC and JCTC have other activities that contribute to students' successful transfer to 4-year institutions including KY-WV LSAMP institutions. In addition, there are transfer programs at other alliance institutions.
- 3) Articulation agreements.** KY-WV LSAMP partners (such as WVU and WKU) also have articulation agreements with other 2-year and 4-year institutions. It is important to note the relationships and connections of partner institutions with non-partner institutions in the region for expanded reach of students transitioning successfully.

As a requirement of the new grant, KY-WV LSAMP submitted a Transfer Report to NSF within 30 days of receiving the grant award. A copy of the full report is posted on the program website.

Academic assistance.

All campuses in the alliance offer academic assistance. Some offer connections to campus-wide services and programs such as tutoring centers, Student Support Services (and similar) programs, supplemental instruction programs, and use of high-impact practices such as community-based learning. Some offer LSAMP and/or campus-funded tutoring support and academic coaching such as Marshall's therapeutic intensive advising model – where each Scholar works with an assigned progressive advisor to create a written academic and advising plan. KSU and WVU have LSAMP activities geared to academic content and instruction. The **Peer Led Team Learning (PLTL)** program at KSU is a supplemental instruction activity in which LSAMP participants spend time outside of class working in cooperative groups on class concepts. These sessions focus on subjects such as chemistry, calculus, and physics. The **Emerging Scholars Program (ESP)** at WVU involves calculus classes that are taught in cooperative groups rather than the traditional lecture-style. Both PLTL and ESP are grounded in research by Uri Treisman. An article on the success of ESP has been published in *Problems, Resources, and Issues in Mathematics Undergraduate Studies (PRIMUS)*.

Hispanic student recruiting and support.

Hispanic students are a rapidly growing demographic in the region. Some alliance campuses have specific programs/initiatives for the Hispanic/Latino communities. For example: BCTC partners with KSU on exemplary award-winning programs such as the Latino/Multicultural Student College Fair; UofL has a designated Hispanic recruiter; and UK has connections with research mentors, Dr. Eduardo Santillan-Jimenez and Dr. Isabel Escobar, who target Hispanic/Latino recruitment for the Engineering Broadening Participation program (NSF-funded) and the Society of Hispanic Professional Engineers, respectively.

Professional development and graduate school preparation.

Attainment of STEM degrees beyond the bachelor's degree is a goal of KY-WV LSAMP. To this point, KY-WV LSAMP provides professional development and support for preparing Scholars to successfully apply for and complete graduate programs. These sessions also aid in community building among the participants and prepare them for becoming leaders as they pursue careers in STEM. Graduate school was the main focus for the 2020 KY-WV LSAMP Annual Research Symposium. In addition, several Scholars attended a GEM Grad Lab at the University of Tennessee, Knoxville, in September 2019.

Transition and support for graduate study.

KY-WV LSAMP facilitates participants in applying for graduate fellowships such as the NSF Graduate Research Fellowship Program (GRFP), Sloan Foundation, Ford Foundation, GEM, and Bridge to the Doctorate (BD). KY-WV LSAMP campuses have scholarships and fellowships for graduate study as well. For example, the Marshall University Chancellor Scholars Program offers full tuition and living expenses for select minority students pursuing a Ph.D. in biomedical sciences.

KY-WV LSAMP now qualifies to apply for LSAMP BD funding. Proposals are anticipated to cycle through UK, WVU, and UofL. A proposal was submitted November 1, 2019. KY-WV LSAMP received notification of award May 2020. The University of Kentucky will support 12 graduate students who are all former LSAMP scholars for two years of graduate study beginning Fall 2020. We are excited to begin this new initiative and anticipate significant increases in recruitment as well as retention of students from underrepresented populations in STEM graduate programs. WVU will submit a proposal November 2020 for the possibility to host a cohort 2021-2023.

Internet and Social Media.

KY-WV LSAMP strives to increase communications and dissemination of program accomplishments and best practices. The program website has been updated and continues to evolve to include more information and resources for Scholars, program staff, mentors and faculty across the nation. Features include, but are not limited to: information on each of the partner campuses, important resource links for Scholars and other students, and copies of the Annual Reports and symposium program books.

<http://www.uky.edu/KYWV-LSAMP/index.html>

The Facebook group continues to grow. Though it has not, yet, gained adequate participation, it will aid in conversations regarding accomplishments and opportunities. Information and questions may be posted by anyone who is a member of the Facebook group. Scholars are encouraged to post questions to each other and to other members of the group including faculty mentors and graduate students. The possibilities are endless.

<https://www.facebook.com/groups/750676201700146/>

KY-WV LSAMP now has Twitter and Instagram accounts.

@KYWVLSAMP, <https://twitter.com/KYWVLSAMP>

<https://www.instagram.com/kywvlsamp/>

Social media will be utilized more in the new phase of the program. An Ambassador Group of program participants is being created. One scholar from each campus will be selected to serve in this group. They will be given leadership training and opportunities in order to lead the presence of KY-WV LSAMP in social media outlets. The first training session was held Tuesday, May 26, 2020.

Program Activities

External evaluation team.

Dr. Willie Pearson, Jr., a prominent and well-respected scholar and evaluator with extended experience in URM STEM education, will continue to serve as the program evaluator. The role of the evaluation team will be to help guide the Alliance to refine and improve the program over time, to advise on best practices in collecting key information without introducing undue administrative record-keeping burden, and to help the leadership team interpret and analyze the evaluations in terms of effective best practices. Ed Marshall and Dr. Cheryl B. Leggon assist Dr. Pearson in evaluating the program.

Institute advisory board.

The Institute Advisory Board (previously called the Governing Board), comprised of the presidents of the KY-WV Alliance Institutions, provides high-level direction for the Alliance. As KY-WV LSAMP PI and lead institution President, Dr. Eli Capilouto communicates with Board members and other key campus administrators to review Alliance progress and reports from the external evaluator to provide relevant guidance and feedback to the Alliance. A video meeting of the Institute Advisory Board was held on Wednesday, September 11, 2019. The meeting was led by President Capilouto. Other campus presidents in attendance were Dr. Koffi C. Akakpo, BCTC; Dr. Timothy C. Caboni, WKU; Dr. Ty J. Handy, JCTC; and Dr. John A. Roush, Centre. Discussions included a history of LSAMP and the KY-WV alliance, the recently funded LSAMP Centers of Excellence, the Bridge to the Doctorate initiative, alliance statistics, and the annual research symposium.

External advisory board.

An advisory board of professionals in higher education as well as research, diversity, and community organizations has been created. Members of the board provide expert advice on program activities and initiatives and represent a variety of backgrounds and experiences. Board members are listed in Table 5. Each year, board members will review the KY-WV LSAMP Annual Report and provide feedback on program activities during a video conference held in the fall. In the spring, board members will be invited to attend the Annual Research Symposium. Board members may also be asked to serve as speakers, critique Scholar research presentations, or volunteer in other capacities.

Table 5: Members of the External Advisory Board

Name	Institution/ Organization	Discipline / Position	Expertise
Bessie Guarrant – 2019 Chair	UK Office of Undergraduate Research	Associate Director	Research Experiences and Professional Development
Carolina Atkins	KY Council on Postsecondary Education	Chief Diversity Officer	Recruitment and Retention
Daniel Crockett	WV Higher Education Policy Commission	Director of Student and Educational Services	Recruitment and Retention
Charles Holloway	Morehead State University	Chief Diversity Officer	Diversity and Inclusion
Michael J. Lauer	STEAM Academy	Science Teacher	Academic Preparedness and Recruitment

Julia Roberts	Gatton Academy	Executive Director	Academic Preparedness and Recruitment
Sonia Sanders	KSU; Central Kentucky Diversity Consortium	Assistant VP for Public Engagement and Community Outreach; Board member	Diversity and Inclusion
Tina Stevenson	STEAM Academy	Director	Academic Preparedness and Recruitment
Jan Taylor	WV EPSCoR	Director	Research Experience and Professional Development

Electronic copies of the 2019 Annual Report were provided to members of the Advisory Board. An Advisory Board video meeting was held on Monday, October 7, 2019. Those who attended the meeting were: Charles Holloway, Jan Taylor, Dawn Offut, and Fara Williams, KY-WV LSAMP. The agenda for the meeting included: overall thoughts on the 2019 Annual Report and 2018-19 program activities, events to come, thoughts for connections in the near future, and director visits to campuses. One of the key take-aways from the 2018 meeting was for members of the advisory board to visit partner campuses. Thus, when the project director scheduled the 2019 visits, members of the Advisory Board were invited to participate. One of the key take-aways from the 2019 meeting was a need for a plan to address the GPA goal. Suggested partnerships for the near future included the WV EPSCoR INCLUDES grant and the KY GEAR UP program.

Two Advisory Board Members attended the 12th Annual Research Symposium: Bessie Guarrant and Michael J. Lauer.

Links to affinity programs.

Each campus has unique resources and connections. This includes enhanced collaborations and connections with K-12 institutions and community organizations. Campuses in the KY-WV LSAMP alliance have also been given awards for diversity and other accomplishments. Examples of connections and honors are listed below. Select honors have accompanying news releases which can be found in Appendix B.

Bluegrass Community and Technical College

BCTC/KSU BLINKS Transfer Enterprise is a transfer collaboration. B is for BCTC, K is for KSU, and LINK is for The Links, Incorporated. The Links, Inc. *is one of the oldest and largest volunteer service organizations of women who are committed to enriching, sustaining, and ensuring the culture and economic survival of African Americans and other persons of African ancestry.* Students who are selected for the BLINKS Program receive an opportunity to utilize mentoring, study strategies, and other resources to help them be successful at BCTC and to graduate with an Associate of Arts or an Associate of Science degree. After which, if they have a 2.8 GPA or above, they are awarded full tuition to KSU for their undergraduate study. The purpose of the program is to: *increase the graduation rate of community college students, increase the number of community college students who transfer to HBCUs, encourage greater collaboration among community colleges and HBCUs, increase the enrollment of selected HBCUs, and increase the graduation rate of students at HBCUs.*

Since its beginning, BLINKS has run on mutual promises. However, Fall 2018, an official MOU was signed by both BCTC and KSU to keep the program going. BLINKS was selected to receive the Access Heritage

Award. “This award is granted by the University to an individual / program who has made significant contributions to the equal educational opportunity and institutional access heritage of Kentucky State University.” <http://www.linksinc.org/>
http://bluegrass.kctcs.edu/en/Multiculturalism_and_Inclusion/Blinks.aspx

Carnegie Hall is a one week intense summer immersion camp continuing throughout the year with semi-monthly Saturday learning activities. The mission of Carnegie Hall is: *sparkling an age of a generation who conquers all challenges, while remaining committed to success. Constructing mathematical and engineering thought processes so that the sciences and technological aspect lead to more success. Making others stronger, by forfeiting....NOTHING!*
http://bluegrass.kctcs.edu/Multiculturalism_and_Inclusion/Carnegie_Hall.aspx

Latino Leadership and College Experience Camp (LLCEC) is a unique experience that provides Latino and immigrant youth with an intensive college preparation and leadership development experience. Simulating college processes, high school students from across the state of Kentucky are able to enjoy a creative mix of college-like courses, leadership development workshops, team-building activities and social justice awareness. The LLCEC introduces participants to current college students, college professors, community leaders, and an extensive peer network. The close work with professors allows students to forge healthy and challenging professor/student mentorships that focus on academic success and personal accomplishment.
http://bluegrass.kctcs.edu/en/Multiculturalism_and_Inclusion/Latino_Hispanic_Outreach/Camp.aspx

Multicultural Opportunities, Strategic and Institutional Inclusiveness Conference (MOSAIIIC) is a time for candid and sustained dialogs on diversity and inclusion across higher education institutions in the Bluegrass area. This is a conference that is organized and funded by the Central Kentucky Diversity Consortium every year. The 2018 MOSAIIIC Conference was held on November 29-30 at Transylvania University. The theme of this event was “The Great White Lie: A Social Construct that Destroys Society.” A book by Dr. John Hodge was the inspiration for the theme, and he served as one of the keynote speakers. Several BCTC, UK and KSU Scholars as well as program coordinators and project director participated in the event. <http://www.uky.edu/studentacademicsupport/mosaaiic>.

Super Someday is an event to prepare high school students for selecting a college major and exploring career options. Charlene Walker, BCTC VP for Multiculturalism and Inclusion and LSAMP coordinator, completed career assessments with each student to help them in selecting and exploring career choices. Of the 140 students who attended the 2018 Super Someday event, 55 of them scored “Realistic and Investigative” career interests and were assigned career mentors from the STEM fields in which they showed interest.

Centre College

The Posse Foundation has partnered with Centre College for over 10 years. It has identified, recruited and trained 7,728 public high school students with extraordinary academic and leadership potential to become Posse Scholars. Since 1989, these students—many of whom might have been overlooked by traditional college selection processes—have been receiving four-year, full-tuition leadership Scholarships from Posse’s partner institutions of higher education. Most important, Posse Scholars persist and graduate at a rate of 90 percent and make a visible difference on campus and throughout their professional careers.
<http://www.possefoundation.org/>

Centre College has a **commitment to study abroad** experiences. This commitment can be seen in their continued rank in the nation for the number of students who participate in experiences abroad.

University of Kentucky

Center for Academic Resources and Enrichment Services (CARES) is a division of the Office for Institutional Diversity. CARES's mission is to provide a comprehensive academic support system as well as enrichment services to aid in increasing the retention and graduation rates of underrepresented students. Programs and activities assist students in achieving academic excellence and adjusting to student life at the University of Kentucky. Services provided by CARES include: Academic planning through academic progress sessions with a CARES counselor, free tutoring that includes individual tutoring and study groups, assistance with study skills through one-on-one meetings or workshops; and enrichment programs and activities through activities designed to address specific topics at each grade level, i.e. the Critical First Year Program that focuses on topics that range from Understanding Faculty Expectations to Study Abroad Opportunities for first year students, Pathfinders Program that focuses on major exploration and career development for sophomores, and SOAR that focuses on professional and leadership development that enhances career preparedness for juniors and seniors. CARES also hosts the Freshman Summer Program. A University computer lab is also housed at CARES. <http://www.uky.edu/cares/>

Center for Applied Energy Research (CAER) serves as a center to answer today's energy questions. Among the most important aims is to assure that the benefits of investigations, research and study are applied, made available to the public and brought into the widest possible use. The Center, through its technology innovation and service to the community, contributes to improving the lives of Kentuckians by creating jobs and economic opportunities; by sustaining vital industries and public services; and by improving energy efficiency and protecting the environment. <http://www.caer.uky.edu/energy/energy-research.shtml>

Engineering Broadening Participation Program is funded by the National Science Foundation and focuses on mentoring students from underrepresented populations at both the undergraduate and graduate level. Housed at the CAER, the program has three goals: 1) to motivate African American, Hispanic, and Native American students to choose engineering and help them graduate with engineering degrees, 2) to help these students acquire the skills they need to become engineering professionals, academics, leaders, and role models, and 3) to investigate if mentoring in research centers offers advantages over mentoring in traditional engineering departments. Though funding for this program has ended, the connections made during its existence continue to be instrumental in collaborative efforts at UK. <http://enr-mentoring.caer.uky.edu/about.html>

National Science Foundation Research Traineeship (NRT) Grant will combine graduate student training with cutting-edge research in mine land remediation, water treatment, crop production, and power generation and will help address the need for innovators in food, energy, and water systems. A copy of a news release is included in the appendix. <https://nrt.uky.edu/>

NerdSquad makes science an experience; bringing it to life, making it tangible so it becomes real, relatable and above all memorable. LSAMP Scholars in Lexington volunteer with this non-profit organization that provides hands-on science activities and mentoring to K-12 students. KY-WV LSAMP Scholars are also mentored by Cagney "CC" Coomer, NerdSquad founder - a UK biology PhD candidate and Lexington community leader. <https://www.facebook.com/NERD-SQUAD-1429006443980870/>

Office of Undergraduate Research's mission is to promote high quality, undergraduate student-faculty collaborative research and Scholarship in all disciplines across campus, and to use all available resources to support and advance the research endeavor. This office provides extensive matching assistance as well as support for academic year research, summer research, and presentation opportunities and support including the annual UK Showcase of Undergraduate Research and the National Conference on Undergraduate Research (NCUR). <http://www.uky.edu/academy/UGResearch>

STEAM Academy was created through a grant awarded by EDUCAUSE and the Gates Foundation as part of the Next Generation Learning Challenge (More information here:

<http://www.educause.edu/focus-areas-and-initiatives/teaching-and-learning/next-generation-learning-challenges>). This grant was awarded to STEAM due to the partnership with the University of Kentucky and particularly the College of Education Faculty and was used to construct the innovational foundations for STEAM. University of Kentucky Faculty are helping to create the infrastructure and instructional model for STEAM. As content experts, faculty members provide training for classroom teachers across a range of instructional innovations including project-based learning, design thinking, digital literacy, and blended learning. Pre-service teachers, master teachers and faculty all work together in this innovative learning environment. Dual enrollment opportunities, internships, as well as multiple events at the University of Kentucky campus throughout the high school curriculum, will ensure that STEAM students graduate ready for college and careers. <https://sites.education.uky.edu/steam/>

STEMCats, is a Howard Hughes Medical Institute (HHMI) funded initiative. STEMCats is a pre-Fall freshmen academic, research and professional-development residential program. This living learning program is intended for first year students who have applied for a STEM major or who are interested in a STEM major plus a small cohort of transfer students from the Bluegrass Community and Technical College. STEMCats is supported by the College of Arts and Sciences, Pharmaceutical Sciences, Physiology, Molecular & Biomedical Pharmacology, and the Division of Natural Sciences at Bluegrass Community and Technical College. STEMCats will make for a smoother transition for first year and transfer students coming to UK.

<https://stemcats.as.uky.edu/stemcats-about-us>

University of Louisville

The Summer Research Opportunity Program (SROP) directed by the Office of the Executive Vice President for Research and Innovation and the Office of the Provost, provides University of Louisville students, who would like to know more about graduate-level education, with a 10-week research experience in a department that offers graduate degrees. These fellowships will also be available to under-served/under-represented student populations from regional colleges and universities. Mentors will provide students with individualized research projects, and the program will provide group seminars on topics related to research and graduate education. Students should be, preferably, in their sophomore or junior year of study.

<http://louisville.edu/research/students/srop/details>

National Cancer Institute (NCI) Cancer Education Program is a ten week program that begins the day after Memorial Day and includes participation in a cancer research project. Each year, professional and undergraduate students are invited to apply for this annual opportunity.

<https://louisville.edu/provost/ug-research/nci>

West Virginia University

The Emerging Scholars Program (ESP) classes at West Virginia University are 100% funded by the institution. The faculty salaries, classroom space, and other needs of the class are provided by WVU at no cost to the LSAMP program.

Programs on Multiple Campuses

On each campus, the LSAMP program has a close working relationship with the **Diversity Offices**. The level of support and partnership varies among institutions, but types of support have included, but is not limited to: direct financial support for LSAMP Scholars, support for recruitment and retention initiatives, and partnerships with programs housed under the diversity office. In some cases, the LSAMP program is directly housed under the Diversity Office.

Bucks for Brains began in 1997 when *the Kentucky legislature approved a bold plan to reform the state's system of higher education. The goal was to develop a "seamless, integrated system of postsecondary education strategically planned and adequately funded to enhance economic development and quality of life."* A key component of this reform was the state's creation of the Research Challenge Trust Fund, a strategic investment in university research designed to create new jobs, generate new economic activity and provide new opportunities for Kentucky citizens. Commonly known as "Bucks for Brains," the program uses state funds to match private donations, effectively doubling the impact of private investment supporting research in strategically defined areas and planting the seeds for a better future.

The University of Kentucky, University of Louisville, and West Virginia University were selected for the 2019 HEED Award. **This is the third year in a row for all three institutions.** The University of Kentucky was again selected as a HEED Diversity Champion as well. More information and news releases on the awards can be found in the appendix. ***INSIGHT Into Diversity Higher Education Excellence in Diversity (HEED) Award.*** The HEED Award and the Health Professions HEED Award *are the only national awards that honor individual institutions for being outstanding examples of colleges, universities, or health profession schools that are committed to making diversity and inclusion a top priority across their campuses. Sharing this important recognition with your campus and community helps showcase your school's excellence in developing innovators and leaders for today's global workforce.* <http://www.insightintodiversity.com/about-the-heed-award/>

Student Support Services (SSS) Program is a TRiO program funded by the Department of Education. This program exists on many of the alliance campuses and serves as a partner for recruitment and services to LSAMP Scholars. *Funds are awarded to institutions of higher education to provide opportunities for academic development, assist students with basic college requirements, and to motivate students toward the successful completion of their postsecondary education. SSS projects also may provide grant aid to current SSS participants who are receiving Federal Pell Grants. The goal of SSS is to increase the college retention and graduation rates of its participants.* <http://www2.ed.gov/programs/triostudsupp/index.html>

Upward Bound and Talent Search are TRiO programs funded by the Department of Education. These programs are intended for middle school and high school students to prepare them for entrance into and success in college. One or both programs exist on many alliance campuses and serve as a resource for recruiting students to college and the LSAMP program. In addition, there are occasions when LSAMP Scholars serve as volunteers, speakers, and/or summer staff for these programs.

Links with other LSAMP alliances and related organizations.

KY-WV LSAMP has partnered with the University of Texas System LSAMP, the Colorado-Wyoming LSAMP, and the Northeast LSAMP to develop ***Knowledge Independence through Externships (KiTE)***. KiTE is an exchange of program participants who will conduct research during the summer. In 2019, one UK LSAMP scholar (Nicholas Graves) conducted research at the University of Massachusetts, Amherst through the KiTE initiative. Nicholas worked in the Wearable Electronics Lab (WELab) under the mentorship of Dr. Trisha L. Andrew. He worked on creating a fabric antenna array and made an all fabric thermometer using conductive threads and conductive PEDOT-CL coating on commercial cotton substrate. Unfortunately, KiTE had to be cancelled for summer 2020.

The KY-WV LSAMP project director serves as a Liaison for Foundation Relations for the LSAMP NSF International Center of Excellence (LSAMP NICE).

The KY-WV LSAMP project director serves on an advisory committee for the Louis Stokes Midwest Regional Center of Excellence (LSMRCE). Among other projects, this committee is developing a regional campus coordinator handbook, which will have applications and influence the KY-WV LSAMP campus coordinator handbook.

Operations manual.

A draft operations manual (Campus Coordinator Handbook) is created. This document will help to provide guidance to new campus program staff and to create unity and consistency in program communications and data collection and maintenance. The manual includes information such as suggested program activities, requirements for student program participation, instructions and formats for providing participant data, and much more. When the final draft is complete, the document will be provided to each campus in electronic and print formats.

Participant tracking and program reporting.

A database of Scholars has been created to track demographics, program participation, and accomplishments. The database is updated periodically and can be easily edited to store additional information as needed for project evaluation, reports, and dissemination. Templates have been created for quarterly reporting, so information gathered and collected can be more easily documented and be more consistent throughout the alliance.

Quarterly reports are required from each institution. Using a template, coordinators must report on participants (including demographics and academic progress), program activities, and Scholar highlights (such as presentations, publications, honors, and awards). Reports are required to be submitted before invoices will be processed for payment.

Research Study: The Impact of Non-Traditional Teaching Styles and LSAMP
Programs on Non-Cognitive Factors in URM STEM Student Success

Current Year Progress.

Since receiving IRB approval for University of Kentucky on December 11, 2018, and after much miscommunication with its IRB office, required Human Subjects Protections training was completed by coordinators at the 8 additional participating sites (Bluegrass Community and Technical College, Jefferson Community and Technical College, Kentucky State University, Marshall University, Western Kentucky University, West Virginia State University, West Virginia University, and University of Louisville) and Institutional Authorization Agreements were obtained for these sites, granting IRB approval for collection of survey data at all participating sites beginning in 2019. In Spring 2020, an IRB modification was submitted and approved, allowing us to begin conducting semi-structured interviews with a subset of LSAMP scholars at all participating sites starting in Summer 2020.

In Fall 2019 and Spring 2020, pre- and post- surveys assessing non-cognitive factors associated with academic success were administered, as was an end of semester survey examining scholar experiences in LSAMP programs. A total of 129 scholars completed non-cognitive surveys in Fall 2019 and 73 in Spring 2020, while 34 completed the programs survey in Fall 2019 and 5 in Spring 2020 (post-semester data collection is still in progress). These response rates appear to be low, which is very common according to feedback from the external evaluator Willie Pearson. We have also determined that post-semester survey links were not received by at least one site in Spring 2020, apparently due to the institution's firewall, and have begun sending links from 2 different sources to prevent this from happening again.

To improve response rate in the future, we have decided to offer scholars a chance to win an Amazon gift card at each participating site in Fall 2020 and have received authorization from West Virginia's University's OSP to re-purpose Michaluk's travel funds for this purpose. In addition, we are working to find funds to allow us to continue offering gift cards in future years. An IRB modification will be submitted in Summer 2020 for these incentives.

Overall Progress and Recent Dissemination.

Overall, survey data collection and analyses continues, interview data collection begins this summer, IRB modifications continue to be submitted as we progress, plans for dissemination are in place, and the research plan timeline has been adapted and extended for practical reasons. While we have experienced many challenges in conducting the research study, we continue to work toward our research goals. More details on the project, challenges, and the progress made this year are included at the end of the program evaluation found in Appendix C.

Dissemination plans include submission of two Letters of Intent on July 15, 2020, for papers to be submitted by January 31, 2021, to a unique LSAMP Special Issue publication on the theme "Advances in Diversity and Inclusion through the NSF Louis Stokes Alliances for Minority Participation."

1. An Examination of LSAMP Scholars' STEM Self-Efficacy and Identity, and Academic Motivation.
2. A Practical Guide to Conducting Alliance-wide Research: Expectations, Challenges and Solutions.

Posters and/or short papers based on results may be submitted for presentation at relevant conferences. Data collection and analyses examining LSAMP scholars' experiences of racial microaggressions at their institutions is in progress for dissemination in 2021.

Goals for Coming Year.

- Continue to collect survey data from scholars and to increase the number of participating scholars and to collect interview data from a subset of scholars.
- Obtain survey data responses from a matched sample of students at participating institutions.
- Obtain IRB approval for and begin conducting the observational portion of the study.
- Continue to analyze survey, interview, and observation data and disseminate results.
- Continue revising the research plan as challenges arise.

INSTITUTIONAL SUPPORT AND SUSTAINABILITY PLAN

The Alliance plans to continue as a self-perpetuating consortium working to recruit and retain students into undergraduate and graduate STEM programs. Each campus has an institutional commitment for the continuation of the program. Examples of this commitment include, but are not limited to: 1) a portion of the project director’s salary and the financial manager’s salary are supported by the UK Office of the President, 2) ESP sections are, and will continue to be, institutionalized with WVU providing the space and salaries for the professors teaching the courses, and 3) Centre has a diversity specialist on its admission team and has scholarship, support service programs, and community-based learning practices to increase recruitment and retention of URM students. In addition, each campus has connections and resources that help LSAMP leverage support for program participants.

ALLIANCE ORGANIZATION AND STRUCTURE

KY-WV LSAMP is a collaboration of many institutions. More importantly, it is a collaboration of many people who work diligently to provide opportunities and support services to program participants. Without the campus coordinators and those who aid them on each campus, KY-WV LSAMP would not progress and increase the number of STEM degrees granted to URM students. Table 6 is a list of program staff and their LSAMP roles as well as their institution roles. Descriptions of project roles follow.

Table 6: KY-WV LSAMP Key Personnel

NAME	CAMPUS	CAMPUS POSITION	LSAMP ROLE
Eli Capilouto	UK	President	PI
Kazi Javed	KSU	Associate Professor: Chemistry	Co-PI: KY and Campus Coordinator
Lynnette Michaluk	WVU	Social Sciences Research Assistant Professor, Center for Excellence in STEM Education	Co-PI: Research Study
David Miller	WVU	Professor: Mathematics	Co-PI: WV and Campus Coordinator
Johné Parker	UK	Associate Professor: Mechanical Engineering	Co-PI: Lead Institution
Fara Williams	UK	Director: KY-WV LSAMP	Project Director

Willie Pearson, Jr.	GA Tech	Professor: Sociology	External Evaluator
Mark Pittman	UK	Program Manager	Financial Manager
Maurice Cooley	Marshall	Associate VP: Intercultural Affairs & Outreach	Campus Coordinator
Tierra Freeman	KSU	Chair: School of the Social Behavioral Sciences; Professor: Psychology	Research Study Social Scientist
V. Faye Jones	UofL	Interim Associate VP: Diversity and Equity; Associate VP: Health Affairs & Diversity Initiatives; Professor: Pediatrics	Campus Coordinator
Charles McGruder	WKU	Professor: Physics & Astronomy	Campus Coordinator
Hannah Payne	WVSU	Director: Center for the Advancement of STEM	Campus Coordinator
Danielle Sims Brooks	JCTC	Assistant Vice President: Student Affairs	Campus Coordinator
Raül Torres	UK	LSAMP Campus Coordinator	Campus Coordinator
Victoria Cloud	BCTC	Associate Professor: Mathematics	Campus Coordinator
John Wilson	Centre	Professor: Mathematics	Campus Coordinator

Program Staff Roles

Project Director

The director, again, received enrollment and degree data directly from the Kentucky Council on Postsecondary Education (KY CPE) and the West Virginia Higher Education Policy Commission (WV HEPC). This ensures accuracy and consistency in data provided to NSF through the WebAMP system. Each agency was provided a list of NSF CIP Codes. Those codes are used to retrieve data on STEM enrollments and degrees.

Other duties/tasks that continue to be improved include: 1) a database for tracking participant information and activities; 2) continued improvement on the process for collection and maintenance of data to ensure complete accurate information and to make it easier for campus coordinators as well as administration staff; 3) language and ideas for improving the program website; 4) programmatic and documentation ideas for increasing the quality and quantity of program activities and participants on each campus; and 5) planning of the annual alliance retreat for all coordinators and lead program staff.

Financial Manager

Mark Pittman has been designated as the project financial officer at the University of Kentucky. Mr. Pittman (with help and oversight of the Office of Sponsored Projects) 1) creates the subcontracts for the alliance institutions, 2) processes payment of invoices from the alliance institutions, 3) tracks all expenditures, and 4) provides monthly reports to the PI, UK Co-PI, and project director.

Co-PI's and Campus Coordinators

The program co-PI's and campus coordinators as well as the other faculty and staff who assist them are integral to the mission of KY-WV LSAMP. It is their daily leadership and dedication that keep the program moving forward. KY-WV LSAMP staff are committed to helping participants prepare for, find, and take advantage of opportunities that lead them to become experts in their field.

Campus Coordinators are tasked with the day-to-day recruitment and retention of program participants. This includes, but is not limited to: organizing and implementing program activities, communicating with program participants as well as program staff on their campus and throughout the alliance, documenting participant participation, and providing information to program administration for inclusion in alliance reports.

Alliance Meetings

Each year, two face-to-face alliance meetings occur. There is an hour-long meeting during the Annual Research Symposium as well as a 1 ½ day Alliance Retreat in the summer. These meetings serve as opportunities for program administration and staff to discuss best practices and programming issues as well as connect as a community. In addition, in the fall, a video meeting is held, and the project director visits each campus. The itinerary for the visits include discussions with campus staff on programming as well as meetings with participants and other campus faculty, staff, and administrators.

Alliance Retreat

Each year, there is an Alliance Retreat. The 2019 retreat was held June 14-15, 2019, at the Four Points Sheraton, Lexington, KY. The first session of the retreat was a visit with Dr. Eli Capilouto, KY-WV LSAMP PI and President of the University of Kentucky. The retreat continued the development of a more cohesive alliance. Program staff communicated best practices and set goals for 2019-20.

PROJECT EVALUATION / EXTERNAL REVIEW

Each year, the evaluation team visits three of the ten institutions in order to perform focus groups and interviews with Scholars, faculty mentors, program staff, and campus administration. An electronic survey is distributed to Scholars throughout the alliance. Interviews are also held with the project director and other program staff at the lead institution. Using data collected through these methods as well as data provided by the project director, the evaluation team creates an analysis of the success of the LSAMP program as an alliance. They offer recommendations to improve the program as a whole as well as give quality feedback to the site visit campuses. KY-WV LSAMP will continue to address recommendations made during the previous funding period as well as attend to future recommendations. A copy of the complete evaluation is in Appendix C. Below is the Executive Summary and the list of recommendations for 2020.

The KY-WV Louis Stokes Alliance for Minority Participation (LSAMP) Program ([nsf.gov/lsamp](https://www.nsf.gov/lsamp), 2017), funded by the National Science Foundation, aims to enhance the participation of underrepresented racial and ethnic minority (URM) populations in STEM academic majors and careers. Specifically, the current funding cycle continues to build on the previous success, while addressing any unresolved challenges and the most recent COVID-19 campus shutdown.

The most significant themes emerging from this year's site visits are grouped into three major categories: (1) sharing "promising policies and practices", (2) restructuring the Symposium, (3) implementing more formal graduate and professional studies information sessions, (4) providing more off-campus summer research experiences, and (5) presentations at scientific conferences.

Recommendations tended to vary by stakeholder group. Scholars suggested the following: (1) restructuring the content of the Symposium, and (2) more career and graduate studies recruiters at the Symposium. Non-scholars called for: (1) more interaction involving sharing of "promising practices and policies", (2) more input from coordinators in the timing and location of the Symposium, and (3) strategies to secure funds to supplement the LSAMP budget allocations.

Education Research Project. Though not entirely the fault of the research team, this component is off to a slow start. At the time of this year's evaluation, the first survey had been administered, but no analysis had occurred. The research team planned to request a change in "timetable" because the original timelines were deemed unreasonable given the initial experiences in data collection.

Purpose. The primary purpose of this formative evaluation report is to assess the extent to which the KY-WV Alliance (<https://www.uky.edu/kywv-lsamp>) is accomplishing the goals and objectives outlined in its most recent proposal, covering academic years 2018-2023.

Recommendations for 2020.

- The Director should coordinate the administering of Evaluation and Research surveys in order to avoid confusion and survey fatigue among Scholars. Not doing so will result in low-response rates for both surveys, thereby negating the use of quantitative analyses. However, this will require dedicated time from each campus coordinator or program staff.
- At the final activity, provide Scholars with short assessment form to leave their suggestions for improving the event. The Director and the campus coordinators should decide the collection procedure.
- Continue to engage campus coordinators in the agenda planning and scheduling the Symposium. Ideally, this could be done at the Retreat whether remotely or in-person.
- Revise the original research plan design, (especially data collection) including the timetable, to be more appropriate for realities of the daily operations of the various partners. Given the diversity of institutional partners, research may wish to consider a random or stratified sampling approach. Otherwise, results may be skewed towards larger institutions.
- Scholars majoring in pre-med/pre-health complained that much of the focus at the Symposium and some of the online post of external research opportunities fail to address their career interest. In the initial recruitment of Scholars, Program coordinators or staff should inform potential recruits that NSF's focus is on science, technology, engineering, and mathematics and not health/medical professionals. NIH's focus is health and medical sciences and related careers. **(Note that the survey findings reveal a substantial percentage of Scholars plan to pursue MD or MD/PhD degrees.)**
- The retreat should engage campus coordinators in an intentional discussion regarding operation in the text of COVID-19 policies and practices.
- Continue to share promising practices for the evaluators' site visits. *This year's in-person and virtual site visits were exceptionally well planned and executed. All interviewees were on time and well prepared.*
- In view of the increasing student financial aid challenges, campus financial aid officials,

campus coordinators, and the Director should schedule a session on the topic at the Symposium, or a session at each institution, or a virtual session at the Alliance Office.

- Continue to authenticate the accuracy of the LSAMP Scholars' email address. The Alliance will need the cooperation of the institutional partners to be successful. This is a critical matter because an extremely low response rate can render the data useless for analytical purposes.

BROADER IMPACTS, DISSEMINATION, AND OUTREACH

External Partnerships and Funding

Scholars are encouraged to apply for summer internships through local, state, and federal programs as well as industry. Participation in these programs provides Scholars with a wider range of experiences and a larger professional network. These paid summer internships also allow better leveraging of KY-WV LSAMP funds, so the program can support more participants during the academic year as well as the summer. In addition, KY-WV LSAMP has partnerships and collaborations with other organizations, agencies, departments, and companies.

Air Products and Chemicals – *is a world-leading Industrial Gases company in operation for over 75 years. The Company's core industrial gases business provides atmospheric and process gases and related equipment to manufacturing markets, including refining and petrochemical, metals, electronics, and food and beverage. Air Products is also the world's leading supplier of liquefied natural gas process technology and equipment.*

<http://www.airproducts.com/Company/company-overview.aspx>

General Motors, Detroit, MI – *is passionate about earning customers for life. This vision unites us as a team and is the hallmark of our customer-driven culture.* <http://www.gm.com/company/company-overview.html>

Hensel Phelps, Phoenix, AZ – *Plan. Build. Manage. From planning and design, to construction, and facility management, we work to solve our clients' challenges from start to finish, and beyond. Our clients, both domestic and international, have entrusted us with a tremendous range of landmark projects, in nearly every market sector.* <http://www.henselphelps.com/>

Kentucky EPSCoR – *Kentucky Experimental Program to Stimulate Competitive Research exists to stimulate sustainable improvements in the Commonwealth's R&D capacity and to advance science and engineering capabilities for discovery, innovation, and knowledge-based prosperity. KY EPSCoR's activities are focused upon: developing human and physical infrastructure to advance academic research, promoting and nurturing a culture of innovation and economic creativity, and supporting increased STEM education, workforce development, and research participation diversity.* <http://kyepscor.org/>

LSU iREU, France – *the Louisiana State University international Research Experience for Undergraduates program sponsors students who are interested in projects that feature aspects of translational chemistry and incorporate major European "Innovation Campuses" where national laboratory, industry, and university scientists work as teams. This will provide students the opportunity to experience a network of research not typically available to students at most American colleges and universities.* NSF #1263336

NASA Kentucky – Kentucky’s Space Grant Consortium partners with NASA to advance research, education, and workforce development within the state. Managed alongside Kentucky’s NASA EPSCoR, these programs promote aerospace-related scientific and technological innovation. <http://nasa.engr.uky.edu/>

Organization for Tropical Studies (OTS) – OTS hosts an REU in Costa Rica. *The NSF LSAMP REU (open to students from LSAMP member institutions): students will be living at La Selva Research Station or Las Cruces Research Station for their nine-week research experience. Features of this program include 1) research skills in the field, 2) enhancing communication skills through training in scientific writing, oral presentations, science blogging, and videography, and 3) integration of cultural experiences with research development. The program will focus on environmental topics such as biodiversity conservation and agroecology and will offer opportunities to interact with local farmers, smaller field stations, and/or environmental NGOs.*

<https://education.tropicalstudies.org/en/education/undergraduate-opportunities/programs/reu-research-experience-for-undergraduates-in-costa-rica.html>

Research Experiences for Undergraduates – The REU program supports active research participation by undergraduate students in any of the areas of research funded by the National Science Foundation. REU projects involve students in meaningful ways in ongoing research programs or in research projects specifically designed for the REU program. https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5517

Summer Health Professional Education Program (SHPEP) – The program at Louisiana State University is strongly committed to increasing the number of students from underrepresented/underserved, rural, and/or disadvantaged backgrounds who are skilled, confident, and motivated to remain and succeed in challenging academic programs/majors that are designed to support health sciences careers.

<http://www.shpep.org/site/louisiana-state-university-health-sciences-center/>

Summer Health Professional Education Program (SHPEP) – The program at the University of Louisville is a summer enrichment program for first and second year college students interested in exploring a career in the health professions. SHPEP’s goal is to strengthen the academic proficiency and career development of students underrepresented in the health professions and prepare them for a successful application and matriculation to health professions schools.

UK Environmental Research Training Laboratories, Lexington, KY – *The University of Kentucky and the College of Engineering recognize the need to enhance the statewide infrastructure for environmental studies. Open to users from throughout the university, ERTL is a hands on learning and research facility used for a variety of organic and inorganic analyses and microbial analyses. Established in March of 2002, ERTL’s mission is to increase research opportunities and improve results by offering personalized training and access to state-of-the-art laboratory equipment and techniques.* <http://ertl.uky.edu/>

USDA Wallace-Carver Fellowship – offers exceptional college students the opportunity to collaborate with world-renowned scientists and policymakers through paid internships at leading USDA research centers and offices across the United States. The fellows also participate in a high-level week-long Wallace-Carver Leadership Symposium at the US Department of Agriculture in Washington, DC, hosted by the US Secretary of Agriculture.

https://www.worldfoodprize.org/en/youth_programs/usda_wallacecarver_fellowship/

Dissemination

There have been several avenues for dissemination. KY-WV LSAMP continues to update the program website by continuing to add resources for Scholars, faculty mentors, and program staff. There continues to be plans for Co-PI's, campus coordinators, and the project director to submit abstracts to conferences and continue working on articles for peer-reviewed journals. Examples of 2019-20 dissemination includes:

David Miller presented "Building a Community of Underrepresented STEM Majors in Calculus" at the LSMRCE Conference, Indianapolis, IN, October 2019.

Fara Williams led a national LSAMP presentation at the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) Conference, Honolulu, HI, November 2019. This presentation was a collaboration of four LSAMP alliances (Kentucky-West Virginia, University of Texas System, Oklahoma, and Indiana).

For future dissemination, David Miller is working on a chapter for Mathematics Association of American Notes on the ESP Calculus Program as well as another article on ESP for peer-reviewed journals.

Proposal for Bridge to the Doctorate Funding

In November 2019, KY-WV LSAMP submitted a proposal for Bridge to the Doctorate funding. May 2020, funding was awarded. KY-WV LSAMP can now support a cohort of 12 graduate students at the University of Kentucky. We are excited for this prestigious opportunity and look forward to increasing the number of students from underrepresented populations who complete graduate degrees in STEM. A news release on this award was created and distributed through the UKNow. That release can be found in Appendix D.

FACULTY and STAFF HIGHLIGHTS and PROFESSIONAL DEVELOPMENT

KY-WV LSAMP program administration and staff continue to be active in their respective fields as well as disseminate best practices learned via LSAMP. KY-WV LSAMP support staff are an important aspect of the program. Project staff continue to seek professional development opportunities. Copies of abstracts, conference proceedings, pictures and news releases can be found in Appendix E.

Articles

Jones VF and the Committee of Early Childhood, Adoption and Dependent Care. Comprehensive Health Evaluation of the Newly Adopted Child-Revised. Clinical Report. Pediatrics. 143(5); DOI: <https://doi.org/10.1542/peds.2019-0657>

Jones VF. Did that really happen? HSC Celebrating Diversity Newsletter. Summer ed. 2019; 1-2.

Davis DW, Williams PG, **Jones VF**, et al. Longitudinal Trends in the Diagnosis of ADHD and stimulant Use in Preschool Children on Medicaid. Journal of Pediatrics. 2019; 207: 185-191.e1. DOI: 10.1016/j.jpeds.2018.10.062

Jones VF, In the throes of a world pandemic, *Celebrating Diversity*, March, 2020. 1-2.

Jones VF, Hines-Martin V. Covid 19 Shines a Spotlight on Health Disparities. *Celebrating Diversity*. April, 2020. 1-2.

Jones VF, COVID-19, *Ped News*, April, 2020. 2.

Other Highlights

Leondra Gully, UofL Assistant Coordinator, (1) serves on the University of Louisville Staff Senate; (2) serves on the Commission on the Status of Women; (3) presented, “Student Success: How to Survive Your First Year,” at the Louisville Urban League, Louisville, KY, July 2019; (4) presented, “Building Your Leadership Portfolio,” August 2019; (5) presented, “Set Yourself Up for Success,” August 2019; (6) presented, “Your Best Year Ever: Making it Through Your Freshman Year,” October 2019; and (7) presented, “Preparing for Life After College,” February 2020.

V. Faye Jones, UofL Coordinator, (1) serves as invited senior mentor for APA, Research in Academic Pediatrics Initiatives in Diversity (RAPID); (2) serves on the National Advisory Board, RAPID; (3) presented, “Supporting our youth of color; The role of racial socialization” at the Pediatric Grand Rounds, University of Louisville, Louisville, KY, March 6, 2020; (4) presented, “Developing a Technology-Based Oral Health Education Initiative at Family Scholar House” at the Research! Louisville, Louisville, KY, September 10-13, 2019; (5) presented, “Differential diagnosis and treatment of severe mental health in children by health professional shortage areas and demographic characteristics” at the Pediatric Academic Societies, April 26-May 6, 2020, in Philadelphia, PA; and (6) received a 2019 award for Best Docs in Louisville, KY by Kindred Healthcare, <https://www.louisville.com/top-doctors-2019>.

David Miller, WVU Co-PI and campus coordinator, served as a reader of AP calculus exams and presented at the LSMRCE Conference in Indianapolis, IN.

Johné Parker, UK Co-PI, attended the inaugural LSAMP NICE Meeting, Washington, D. C., September 8-10, 2019.

Hannah Payne, WVSU campus coordinator, served in a leadership capacity in planning and implementing the West Virginia Research Day at the Capitol, Charleston, WV.

Raúl Torres, UK campus coordinator, (1) attended the Black Engineer of the Year Award (BEYA) Conference, Washington, D. C., February 13-15, 2020; (2) attended the GEM Grad Lab at the University of Tennessee, Knoxville, TN, September 27-28, 2020; (3) accompanied scholars to the Annual Biomedical Research Conference for Minority Students, Anaheim, CA, November 13-16, 2019; (4) accompanied scholars to the Black Engineer of the Year Award Conference, Washington, D.C., February 13-15, 2020; (5) attended various UK professional development trainings; and (6) volunteered for NerdSquad – a local non-profit that provides tutoring, mentoring, and hands-on science activities for Lexington K-12 students.

Charlene Walker, BCTC campus coordinator, retired June 2019. Though she is no longer the LSAMP coordinator, we look forward to continued work with her. We know her legacy will live on.

Fara Williams, project director, (1) planned and implemented an Alliance Retreat for KY-WV LSAMP program staff including Co-PI's and Campus Coordinators, Four Points Sheraton, Lexington, KY, June 14-15, 2019; (2) presented/volunteered for the Cherokee College Preparatory Institute (CCPI) - college readiness program for Native American high school juniors and seniors, at Northeastern State University, Tahlequah, OK, July 13-19, 2019; (3) attended a Trevor Noah presentation at the University of Kentucky; (4) attended the inaugural LSAMP NICE Meeting in Washington, D. C., September 8-10, 2019; (5) accompanied LSAMP scholars to the GEM Grad Lab at the University of Tennessee, Knoxville, TN, September 27-28, 2019; (6) attended the Women of Color STEM Conference, Detroit, MI, October 3-5, 2019; (7) served on the planning committee and attended the LSMRCE Conference, October 25-27, 2019; (8) led a session on LSAMP at the SACNAS National Conference, Honolulu, HI, October 30-November 2, 2019; (9) presented "Workplace Ethics" to the Humanity Academy, Lexington, KY, January 31, 2020; (10) continued to serve as a member of the IN LSAMP Policy and Procedure Manual Committee, a committee formed to produce a policy and procedure manual; (11) attended meetings of the Kentuckiana FileMaker Developers Group, Louisville, KY; (12) presented LSAMP to students individually and in groups including at the BCTC STEM Academy; (13) attended various UK HR Professional Development sessions; (14) attended various events and activities at the University of Kentucky including staff appreciation day; and (15) served on several hiring committees.

SCHOLAR and ALUMNI HIGHLIGHTS

Conferences and Symposia

There were some conferences that were attended by Scholars from multiple campuses. In some cases, travel for these events was coordinated in order to provide opportunities for Scholars on different campuses to meet and interact with one another.

Women of Color STEM Conference

Twenty-two KY-WV LSAMP Scholars attended the Women of Color STEM Conference held in Detroit, MI, October 3-5, 2019.

Black Engineer of the Year Award (BEYA) Conference

Twenty KY-WV LSAMP Scholars attended the BEYA Conference in Washington, D. C. February 13-15, 2020.

National Conference on Undergraduate Research (NCUR)

The 2020 NCUR was cancelled due to COVID-19. However, there were eight abstracts accepted for presentation from KY-WV LSAMP Scholars.

Individual Accomplishments

Articles and Conference Papers

Materials Research Society, Boston, MA, December 3, 2019, 8:00 PM - FF05.06.37

Large-Area, Uniform Growth of Nanoporous Biocompatible Polymer by Pressure- and Flux-Controlled Vapor Deposition

Joonhee Lee¹, Katelyn Ramsey¹, H M Azazul Karim¹

West Virginia University¹

Abstract

Nanoporous polymers are emerged as important elements due to their potential applications utilizing controllable optical, mechanical, and microfluidic properties, such as biosensor, which bulk polymer cannot offer. Parylene-C has been used for various micro-electromechanical systems (MEMS) and optoelectrical devices due to its electrical insulation and optical transparency. Moreover, it is commonly used as an encapsulation layer in biomedical devices to take advantages of biocompatibility, low water absorption rate, and pinhole free conformal coating.

Several methods were suggested to grow nanostructured parylene-C but still limited to a small area or difficult to control the porosity [1-2]. In this work, to overcome current limitations, we report the novel combinatorial approach of nanoporous parylene growth method by controlling process pressure and vapor flux. Commercial PDS2010 (Specialty Coating System) was modified with custom-designed 3D printed nozzles to provide the directional and localized vapor flux to the substrate, while other parameters are the same. With the elongated tip of nozzle geometry (rectangular) and in increased process pressure, the porous layers were formed due to the enhanced deposition rate. The uniform layers over the 4-inch diameter were successfully grown in the optimized nozzle design. Together with scanning electron microscopy observation, we also characterize the optical properties of the films with the spectroscopic ellipsometry tool for precise porosity measurement. Along with pressure- and flux controlled nanoporous polymer growth, potential applications and an outlook to the future will be discussed.

[1] Pursel, S., Horn, M. W., Demirel, M. C. & Lakhtakia, A. Growth of sculptured polymer submicronwire assemblies by vapor deposition. *Polymer*. 46, 9544–9548 (2005).

[2] Binh-Khiem, N., Matsumoto, K. & Shimoyama, I. Porous Parylene and effects of liquid on Parylene films deposited on liquid. *IEEE 24th International Conference on Micro Electro Mechanical Systems* 111–114 (2011).

Jack Brown has a paper that was published: C. Pu, N. Payne and J. Brown, "Self-Adjusting Share-Based Countermeasure to Interest Flooding Attack in Named Data Networking," *2019 International Conference on Internet of Things (iThings) and IEEE Green Computing and Communications (GreenCom) and IEEE Cyber, Physical and Social Computing (CPSCom) and IEEE Smart Data (SmartData)*, Atlanta, GA, USA, 2019, pp. 142-147, doi: 10.1109/iThings/GreenCom/CPSCom/SmartData.2019.00045.

Honors and Presentations

Many Scholars made accomplishments and received honors throughout the 2018-19 academic year. Snapshots and news releases of select accomplishments can be found in Appendix F. Below are some examples of KY-WV LSAMP Scholar accomplishments.

Fadumo Abdullahi, UofL, graduated Spring 2020 and plans to apply to medical school.

Laura Acevedo, UofL, graduated Spring 2020 and has accepted an internship with MITRE in Washington, D.C. That internship has transitioned to remote. Laura plans to start her own business.

Madewa Adeniyi, WVU engineering scholar, presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Asahel Aguilar-Ortiz, UK engineering scholar, presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Gretel Alvarez, Marshall scholar, has been accepted to graduate school in health administration.

Ella Aponte, Centre, presented at the Centre College RICE (Research, Internships, Creative Endeavors) Symposium May 4, 2020.

Malik Appleton, UK, (1) presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020; (2) presented at the KBRN end of summer event, August 2019; (3) had an abstract accepted for the National Conference on Undergraduate Research in Bozeman, MT.

Brooke Armenta, UofL, graduated Spring 2020 and plans to gain more lab experience before applying to PhD programs.

Nia Bard, UofL, was selected as the UofL LSAMP Scholar of the Year.

Koji Barnaby, WKU biology senior, presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Lloyd Bartley, UofL cellular biology senior, participated in the Louisiana State University iREU in France, Summer 2019.

Charles “Carlos” Beasley, UK, and will conduct research in France summer 2019.

Samantha Belcher, WVSU, (1) presented at the LSMRCE in Indianapolis, IN, October 2019; presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Clayton Bell, Centre, (1) made an oral presentation at the Centre College Summer Research Seminar; (2) presented “Critical Reflection Dissipates Internal Wave Energy” at the American Physical Society Division of Fluid Dynamics Meeting, Seattle, WA, November 2019; (3) presented “Stratified Fluids as a Model of Geophysical Systems (Energy Dissipation in Reflecting Internal Waves)” at the Centre College RICE (Research, Internships, Creative Endeavors) Symposium May 4, 2020; presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Francisco Beltran, UK agriculture biotechnology scholar, presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020. He also had an abstract accepted for the BSCP Student Conference, April 2020.

Micai Benford, Centre, made an oral presentation at the Centre College Summer Research Seminar and presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

William Britt, Centre, (1) made an oral presentation at the Centre College Summer Research Seminar; presented “Creating a High School Sports Rating System” at the Joint Mathematical Meeting, Denver, CO, January 2020.



Jack Brown, Marshall biology Scholar, presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020. Jack has received the prestigious SMART Scholarship from the National Defense Education Program. Through this scholarship, she will participate in a summer internship with the Department of Defense.

Diego Cabanillas, WVU engineering scholar, presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Arrah Calvin, WKU engineering scholar, presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Gustavo Camargo Silva, WKU agriculture senior, (1) presented at the Society for the Advancement of Chicanos and Native Americans (SACNAS) National Conference in Honolulu, HI; (2) presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020; (3) had an abstract accepted to the National Conference on Undergraduate Research, Bozeman, MT – the event was cancelled; (4) received the International Student Award of 2020 by the Department of Agriculture and Food Science; (5) has regularly been on the President’s List; and (6) was accepted to conduct research in Uzbekistan, but the IRES was cancelled for summer 2020.



Trevor Claiborn, (Former BCTC) KSU agriculture graduate, is also known as Farmer Brown tha’ MC and continues to be featured by various media. He continues to write songs, produce videos, post on social media, and remain an active participant in community projects. <https://www.farmerbrownthamc.com/>

Jacob Clay, UK, presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Ethan Coats, KSU scholar, conducted research in the KSU MatLab Summer 2019.

Lauren Curd, UofL, graduated Spring 2020. She plans to work as a full-time business analyst/Scrum master at UPS. She will also be working on her Masters of Science in Business Analytics at UofL.

Evonie Daugherty, UofL, conducted research in the Psychology KID Lab. She graduated Spring 2020 and plans to apply for physical therapy school.

Demetrius Davis, KSU biology senior, conducted biotechnology and water quality research at KSU summer 2019.

Mikayla Demetrakis, UofL, presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020. graduated Spring 2020 and has been accepted to the University of Louisville School of Medicine. She hopes to become an obstetrician/gynecologist and continue speaking Spanish.



Shannon Derkson, UofL, (1) served as the UofL LSAMP Student Coordinator; (2) participated in the Summer Research Opportunity Program (SROP) at UofL for Summer 2019; (3) conducted research in the Learning & Performance Lab at the University of Louisville where she was mentored by Dr. Marci DeCaro; (4) presented, “Can Active Learning Close the Minority Achievement Gap?” at the conclusion of SROP, Summer 2019; (5) presented at the KY-WV LSAMP Annual Research Symposium, February 28-29, 2020; (6) presented at the Annual Biomedical Research Conference for Minority Students (ABRCMS), Anaheim, CA, November 13-17, 2019; (7) presented at the University of Louisville Undergraduate Research Showcase, April 2020; (8) completed and successfully defended her psychology honors thesis, Spring 2019; and (9) plans to complete a Masters of physiology before applying to MD and MD/PhD programs.

Camron De’Vine, UK scholar, has a publication (along with Asare Nkansah) from his undergraduate research.

Raquel Dominguez, WKU meteorology senior, conducted meteorology research at the National Weather Center in Oklahoma summer 2019.

Cruz Dreyfuss, Centre, graduated Spring 2020.

Kendra Ford, UofL, was selected Student of the Month in February 2020 and received the 2019-20 Cardinal Award. She graduated Spring 2020 and has been offered a position with GE in their Appliances Supply Chain Development Program.

David Fowler, KSU computer science scholar, participated in a REU at Wright State University Summer 2019 and presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Lynnora Grant, WVU graduate, is currently a 3rd year Ph.D. candidate at Rice University. She is studying materials science and nano engineering under the mentorship of Dr. Higgs and Dr. Cordero. Lynnora received a 2017 Graduate Research Fellowship and a 2019 Ford Foundation Predoctoral Fellowship. In addition, Lynnora has presented her research at many conferences including the 44th International Conference and Expo on Advanced Ceramics in Daytona, FL and the Ford Conference of Fellows in San Juan, PR.

Nicholas Graves, UK senior, was selected to participate in the inaugural 2019 KItE initiative. He presented at the LSMRCE Conference, Indianapolis, IN, October 2019 and at the Annual Biomedical Research Conference for Minority Students (ABRCMS), Anaheim, CA, November 2019.

Joshua Hernandez, WVU engineering scholar, presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

William Hicks, UK scholar, presented at the UK Showcase of Undergraduate Scholars, April 2020.

Kamara C. Hollins, KSU scholar, conducted research in the KSU MatLab Summer 2019.

Victor Holness, UK, and will conduct research in France summer 2019.

Annalisa Huckaby, WVU, (1) presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Cierra Isom, UK biology senior, presented at ABRCMS, Anaheim, CA, November 2019.

K. Juliana Jeremiah, UK graduate, completed her MPH at Upstate Medical School in Syracuse. While there, she was a graduate student program coordinator for LSAMP. She has conducted research with a NGO based in Ecuador – Walking Palms Global Health. This research has led to a platform for medical ethnobotany in coastal Ecuador that is being used by four different organizations. Kisha is now applying to Ph.D. programs and is interested in focusing on emerging infectious diseases.

Madison Jeziorski, Centre, presented at the Centre College RICE (Research, Internships, Creative Endeavors) Symposium May 4, 2020.

Rachel Johnson, UofL, graduated Spring 2020 and plans to continue her education with a Masters in computer science and engineering.

Mahireyaa Kao, KSU biology sophomore, conducted biotechnology and water quality research at KSU summer 2019.

Jeremy Kimbrough, KSU, conducted research at the University of Kentucky College of Agricultural Systems Summer 2019.

K'Lynn King, UK chemical engineering junior, received a Summer 2019 internship with Boeing.

Jonathan Kingsly, WVU, presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Savannah Lewis, UK electrical engineering junior, received a summer 2019 internship with Lockheed Martin.

Olivia Lim, WVSU, presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Scott Lopez, WVU chemistry senior, presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Zedan Martin, WVSU, (1) presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Corey Mattic, Jr., KSU chemistry and chemical engineering senior, presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Drew Meaux, Centre scholar, graduated and is now an IT technician at Bluegrass IT Services.

Caitlin Mickles, WVU, presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Ana Gabriela Mira, Centre, graduated Spring 2020.

Safiyah Mitchell, Marshall scholar, has been accepted to the Marshall University PharmD program.

Emma Moore, WKU mathematics sophomore, (1) presented at the Society for the Advancement of Chicanos and Native Americans (SACNAS) National Conference in Honolulu, HI; (2) presented at the WKU Math Symposium, November 2019; (3) presented at the Joint Mathematics Meeting, Denver, CO, January 2020; (4) presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 2020; (5) had an abstract accepted to the National Conference on Undergraduate Research, Bozeman, MT – the event was cancelled; (6) has regularly been on the President’s List; (7) received the 2019 Hugh F. and Katherine A. Johnson Award in Mathematics; (8) received the 2020 Henry M. and Zula G. Yarbrough Mathematics Scholarship; and (9) was listed as second author on a publication that was submitted to Wolfram from peer-revision in 2020.

De’Anthony Morris, WVU, presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Lukas Negron, WKU, presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020.



Asare Nkansah, UK computer science graduate, (1) attended the Alltech One19 Ideas Conference, an international event, Lexington, KY, May 19-21, 2019; (2) was instrumental in a freshmen iPad initiative at UK; and (3) has a publication (along with Camron De’Vine) from his undergraduate research.

Ephraim Otieno, UofL, presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020. graduated Spring 2020 and has been accepted to the University of Louisville School of Medicine.

Oriana Ovide, WVU, (1) presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Darian Parker, UK mechanical engineering senior, (1) conducted research in France summer 2019; (2) presented at the ABRCMS in Anaheim, CA, November 2019; (3) presented at the Emerging Researchers National Conference; and (4) was accepted to conduct research in Uzbekistan, but the IRES was cancelled for summer 2020.

Ja’Keshia Peterson, WVSU, presented at the LSMRCE in Indianapolis, IN, October 2019.

Katelyn Ramsey, WVU bioengineering scholar, presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Derek Roberts, KSU computer science scholar, participated in a REU at Georgia State University Summer 2019 and presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Ariel Robinson, UK civil engineering senior, was accepted to the Duke University Sloan and Pratt School of Engineering Graduate Program and Fellowship Application Boot Camp, September 5-6, 2019, in Durham, NC; presented at the UK Showcase of Undergraduate Scholars, April 2020.

Cyrus Salazar, Centre, presented “Constructing a Yeast-1-Hybrid to Analyze Leaf Senescence Regulation in *Medicago Truncatula*” at the Centre College RICE (Research, Internships, Creative Endeavors) Symposium May 4, 2020.

Masooma Seyal, UofL, graduated Spring 2020 and plans to work as a paralegal before applying to law school.

Ishita Sharma, Marshall, presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020, and has been accepted to Marshall Medical School.

Alexius Shorter, KSU biology senior, conducted research at KSU Summer 2019. She presented at the Louis Stokes Midwest Regional Center of Excellence (LSMRCE) Conference at which her abstract was ranked in the top 25 out of 160 submitted.

David Suarez, WKU mathematics scholar, presented at the KY-WV LSAMP Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Esther Tabugbo, UofL, graduated Spring 2020 and plans to pursue a Masters in physiology and medical school.

Afi Tadedji, UofL, was awarded the Brice Simpson Memorial Scholarship in 2019.

Ndeye Thiaw, UK biology graduate, is now a physician assistant student at UK.

Malik Thompson, KSU scholar, conducted research in the KSU MatLab Summer 2019.

Valerie Tran, UofL, completed the UofL Leader’s Legacy Program and was spotlighted by Student Involvement for “Profile in Leadership.”

Erika Tucker, UofL, graduated Spring 2020 and plans to start a leadership program at Lockheed Martin in July 2020. She will also pursue a Master’s in Business Administration and Project Management.

Mya Vannoy, WKU, (1) presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

Marielena Villaran, Centre, made an oral presentation at the Centre College Summer Research Seminar; (2) presented “Improving Cancer Cytotoxicity of Mithramycin Analogues with Semi-Synthetic Derivatives” at the Centre College RICE (Research, Internships, Creative Endeavors) Symposium May 4, 2020.

Alyse Washington, WVU biology, presented at the KY-WV LSAMP 12th Annual Research Symposium, Frankfort, KY, February 28-29, 2020.

APPENDIXES

APPENDIX A
KY-WV LSAMP 12th
ANNUAL RESEARCH SYMPOSIUM
FRANKFORT, KY
FEBRUARY 28-29, 2020

KY-WV LSAMP

12th Annual Research Symposium



Kentucky State University

Frankfurt, KY

February 28-29, 2020

Friday, February 28, 2020 **For LSAMP Only**

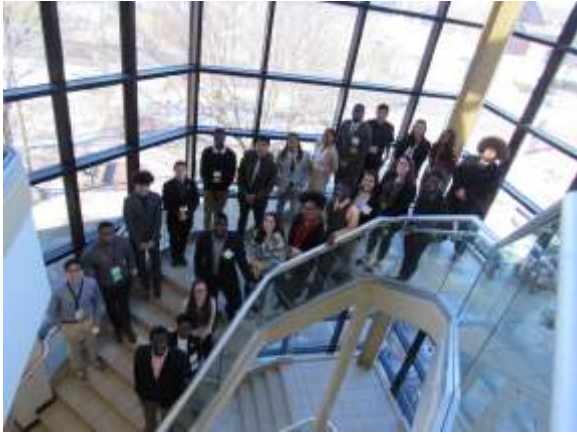
Capital Plaza Hotel

02:00-04:00 PM	Symposium Registration	
02:00-03:00 PM	Speed Mentoring	Raúl Torres, KY-WV LSAMP Coordinator
03:00-03:15 PM	Welcome and Introductions	Kazi Javed, Ph.D. KSU Chemistry Professor and KY -WV LSAMP Co-PI Fara Williams, KY-WV LSAMP Director
03:15-04:00 PM	KY-WV LSAMP	Fara Williams, KY-WV LSAMP Director
04:00-05:30 PM	Graduate School Application Process	Mike Heppler, Graduate School Expert
05:30-06:00 PM	Dinner	
06:00-07:00 PM	Graduate Student Panel	Mike Heppler, Moderator Graduate Students Cagney Coomer Norman Loving Courtney McKelphin Julia Parker Kayla Titialii-Torres
07:00-08:00 PM		Gabrielle Luis, Vanderbilt
08:00-09:00 PM	Networking Mixer / One-on-One Clinic	

Saturday, February 29, 2020 **For the General Public & LSAMP**

Kentucky State University - Student Center

08:00-10:00 AM	Symposium Registration and Refreshments		Ballroom
08:15-08:45 AM	K-12 Student Orientation		TBD
09:00-09:30 AM	Welcome and Introductions	Fara Williams, KY-WV LSAMP Director Beverly Schneller, Ph.D., KSU Interim Provost & VP for Academic Affairs Charles McGruder, Ph.D., WKU LSAMP Coordinator	Ballroom
09:30-10:30 AM	Keynote Presentation	Astrid Suarez, Ph.D., Meterologist, US Air Force Civil Service	Ballroom
10:30-10:45 AM	Pictures		TBD
10:45-11:00 AM	Break		
11:00-12:00 PM	Oral Presentations	See Presentation List	Ballroom
11:00-12:00 PM	K-12 Session		TBD
12:00-01:15 PM	Networking Lunch		Ballroom
12:00-01:15 PM	Alliance Meeting Lunch	KY-WV LSAMP Administration, Campus Coordinators, and Invited Guests	TBD
01:15-03:15 PM	Recruitment Tables	See Recruitment List	Ballroom Alcove
01:15-02:15 PM	Poster Session 1 - Odd #'s	See Presentation List	Ballroom
02:15-03:15 PM	Poster Session 2 - Even #'s	See Presentation List	Ballroom
03:15-03:30 PM	Closing / Recognition Presentations	Fara Williams, KY-WV LSAMP Director	Ballroom



APPENDIX B
CAMPUS CONNECTIONS
AND HONORS

Kentucky State University to host lecture on Louis Stokes and the Kentucky – West Virginia Louis Stokes Alliance for Minority Participation organization

Posted on February 8, 2020 in [Campus News](#)

Kentucky State University will host a lecture on Louis Stokes and the Kentucky – West Virginia Louis Stokes Alliance for Minority Participation (KY-WV LSAMP) organization Feb. 20 in room 115 of Carver from 11 a.m. until noon.

Fara Williams, director of the KY-WV LSAMP, will be providing the lecture.

Williams previously served as the grant coordinator for the Oklahoma Louis Stokes Alliance for Minority Participation for eight years. Williams earned a Bachelor of Science in elementary education from Oklahoma State University and taught in Texas and Alaska.

The KY-WV LSAMP is a consortium of colleges and universities working together to create, enhance and expand programs designed to broaden participation and increase the number of students from underrepresented populations who receive degrees in science, technology, engineering and math (STEM) disciplines.

LSAMP programs run on five-year cycle grants from the National Science Foundation (NSF). The first six alliances were created in 1991. In 1998, the name of the late Ohio Congressman Louis Stokes, who was responsible for numerous minority focused programs through the NSF and the National Institutes of Health (NIH), was added to the program.

\$3 Million NSF Grant to Support the Next Generation of Kentucky Food, Energy and Water Systems Innovators

By **Dave Melanson** Thursday



This project will combine graduate student training with cutting-edge research in mine land remediation, water treatment, crop production and power generation and will help address the need for innovators in food, energy and water systems.

LEXINGTON, Ky. (Oct. 3, 2019) — A multidisciplinary University of Kentucky team will provide unique graduate educational opportunities in food, energy and water systems, thanks to a new National Science Foundation (NSF) Research Traineeship (NRT) grant.

This UK-based NRT, which is titled IN FELLOWS, and an Academy of Innovators at the Nexus of Food, Energy and Water Systems, will be led by Mark Crocker, associate director at the [UK Center for Applied Energy Research \(CAER\)](#) and a professor in [UK's Department of Chemistry](#). It will engage researchers from UK's [Colleges of Agriculture, Food and Environment](#); [Arts and Sciences](#); and [Engineering](#). UK will receive nearly \$3 million from NSF to support this new initiative.

Food, energy and water systems face numerous challenges in Kentucky, across the nation and throughout the globe. New approaches are needed to ensure adequate food supplies for increasing populations, to foster the development of sustainable and carbon-neutral sources of energy and to improve the management of water resources.

Leading those solutions and community-based approaches will be a trained and diverse workforce, integrating an evidence-based, STEM educational model with interdisciplinary research focused on innovation. The project will combine graduate student training with cutting-edge research in mine land remediation, water treatment, crop production and power generation and will help address the need for innovators in food, energy and water systems.

The need for innovative leadership is particularly urgent in Appalachian states where economic dependence of agricultural and energy sectors results in water management issues. In addition, the decline of coal mining is forcing the economy to diversify.

“This is an exciting opportunity for graduate education at the University of Kentucky,” said Crocker. “Graduate training has traditionally taken a monodisciplinary, one-size-fits-all approach. This program recognizes that the solutions to our toughest problems require a multidisciplinary, team-based approach, and we have assembled a talented group of campus collaborators who will help deliver a 21st century graduate experience.”

The academy is expected to train 120 students. The grant will provide 21 of the students with financial support for their graduate work in chemistry, biosystems and agricultural engineering, chemical engineering, forestry, plant and soil sciences, horticulture, and agricultural economics.

In addition to Crocker, who will serve as principal investigator on the NRT, the project will include the following researchers: Eduardo Santillan-Jimenez, UK CAER; Carmen Agouridis, Biosystems and Agriculture Engineering; Tyler Mark, Agricultural Economics; Isabel Escobar, Chemical Engineering; Christopher Barton, Forestry; Luke Moe, Plant and Soil Sciences; James Landon, UK CAER; Seth DeBolt, Horticulture; and Jacinda Dariotis, University of Cincinnati Evaluation Services Center.

“The workforce needed to address society’s challenges must be both well-trained and diverse,” Santillan-Jimenez said. “This National Science Foundation funding will be instrumental in helping UK enhance graduate education by fully integrating research and professional skill development within an inclusive, multidisciplinary and supportive academy.”

Topics to be addressed include mine land restoration to improve hydrology and water quality; the use of greenhouses on restored mine land for year-round food production, requiring localized water treatment powered by renewable energy; the use of algae to treat CO2 emissions yielding organic fertilizer for soil improvement in reclaimed mine land areas; and biomass upgrading to fuels and chemicals, focusing on the valorization of lignin.

The University of Kentucky is increasingly the first choice for students, faculty and staff to pursue their passions and their professional goals. In the last two years, Forbes has named UK among the best employers for diversity and INSIGHT into Diversity recognized us as a Diversity Champion two years running. UK is ranked among the top 30 campuses in the nation for LGBTQ inclusion and safety. The Chronicle of Higher Education judged us a “Great College to Work for,” and UK is among only 22 universities in the country on Forbes' list of "America's Best Employers." We are ranked among the top 10 percent of public institutions for research expenditures — a tangible symbol of our breadth and depth as a university focused on discovery that changes lives and communities. And our patients know and appreciate the fact that UK HealthCare has been named the state’s top hospital for three straight years. Accolades and honors are great. But they are more important for what they represent: the idea that creating a community of belonging and commitment to excellence is how we honor our mission to be not simply the University of Kentucky, but the University **for** Kentucky.*

The National Society of Black Engineers Looks to Leave a Legacy on UK's Campus

By [Aaron Porter](#) Monday



University of Kentucky National Society of Black Engineers. Mark Cornelison | UK Photos.

LEXINGTON, Ky. (Sept. 23, 2019) — According to a new study from the University of Texas at Austin, only 34% of African American college students who go into one of the STEM fields (science, technology, engineering and math) actually finish with a degree in that field. The [University of Kentucky National Society of Black Engineers](#) (NSBE) wants to change that trend.

The study didn't tackle the question of why African American students abandon STEM majors, but there are facts we already know. STEM fields can be demanding, and African American students experience a lack of representation of people who look like them in those fields — both are elements where community support can make a difference.

Students in any major must deal with the transition to college and the feeling of needing to succeed in a new environment. But when students are essentially trailblazers in fields where historically few underrepresented groups are represented, it can present a challenge — one that UK's NSBE is willing to take head-on.

“I believe we are laying the foundation for the minority community,” said Alston Sickles, the financial chair for NSBE. “We are letting them know that they're not alone. There are others like themselves, and we're stronger together.”

Since the genesis of the organization on UK's campus back in 2010, the goal has been to expand the number of black engineers in the country, but the group has become more. It also serves as a safe haven where creative minds can gather and push each other to levels in their education they at times couldn't imagine. These are students who

come from all walks of life and all parts of the world in hopes of fulfilling their dreams in their careers.

As members of the UKNSBE, they are making an impact. When K'Lynn King, the current vice president, was experiencing the turbulence of leaving the comforts of home for a new environment and new academic challenge, UKNSBE understood and gave her the family she needed. "Before NSBE I really didn't enjoy college. I was an out-of-state student, so I didn't really know anyone," King said. "NSBE gave me a sense of belonging and family who understood the struggle of going to class and only seeing one person that looked like you."

What UKNSBE takes pride in, is the family-oriented atmosphere that has brought these engineers together to become some of the brightest and best at UK.

Forming relationships has proven to be a driving force in its growth as an organization. When one member succeeds, they all succeed, and if one is falling behind, they all help that member on their college journey.

This atmosphere is a big reason why UKNSBE President Ariel Robinson, is still in her major today.

"I wouldn't still be in engineering without NSBE. My sophomore year I was so upset I could not pass a class that I wanted to switch majors," Robinson said. "I told my friends in NSBE and they helped me realize I don't want to do anything else."

UKNSBE was recognized at the National Society of Black Engineers' national convention by winning the Region 3 Chapter of the Year award in 2019. Having this success has not blinded the chapter. Robinson wants to see her organization achieve more — winning the national chapter of the year award.

But the list of the group's accomplishments doesn't stop there. At the May 2019 Commencement, the chapter saw 100% of its senior members graduate and find employment right out of school or be admitted into graduate school. Members in UKNSBE also have the chance to enhance their engineering experience by interning and having co-ops with some of the best companies in the engineering industry. From working at Toyota and General Motors to having students at the Massachusetts Institute of Technology (MIT), their hard work and dedication has earned them opportunities all across the country.

The laser focus the organization has on its future and its members' personal careers is what helped shape King into the student she is today. UKNSBE was her first community and the first group of students that showed her how important it was to take school seriously.

“UKNSBE showed me how to be more serious with my major. They informed me on how important research, internships and co-ops were,” King said. “They worked with me on my professional and academic development while giving me room to be myself and have fun. They are a big reason I got my internship with The Boeing Company.”

UKNSBE members have invested themselves in the UK community deeper than just in their respective majors, their reach stretches across UK as members have become leaders here. For Robinson, being a leader and giving back to her UK community is an honor and something she seeks to do as much as she can.

“Knowing that I positively impacted so many people warms my heart,” she said. “Being a student leader has given me the ability to help younger students and has given me the opportunity to network with some campus officials as well.”

UKNSBE as an organization helps teach professional skills that are transferable to all students, as well as members' communities. Robinson wants students to see UKNSBE as an organization anyone can learn from, whether they decide to be an engineer or not.

“We want every student on campus to know that if they are lacking in a professional development area, we can help them. If they are struggling in STEM classes, we can help there too — we can be that group to help,” she said.

Through community service, UKNSBE has been involved heavily in the Lexington community by participating in programs like MetroCATS, where they teach digital literacy to middle schoolers, and Black Males Working, which is working to close the school achievement gap. UKNSBE mentors and invests in others to help make their dreams a reality.

One event, in particular, is called “NSBE Spreads the Love,” where members perform random acts of kindness for the less fortunate in Lexington by hosting clothes drives and providing free food. The community service is something King said has helped her grow as a person.

“Simply put, UKNSBE has shown me how to be a well-rounded human being,” King said.

With two African American women in the president and vice president roles, Robinson wants to encourage other women that nothing is impossible, even in a male-dominated field.

“I want African American women to know, you can do it! I have a little sister and girl cousins who look up to me, and in my position, I want to influence as many young women as possible,” she said.

UKNSBE dares to be different as they put themselves in positions to show the world that anything is possible from anyone. No matter the background, race or culture, the group has decided to work — not just for themselves, but for the entire community. Yes, the work is hard, but the impact on lives is worth it. This organization is about leaving a legacy and foundation that the next group of students can stand on and see further than those before them.

The University of Kentucky is increasingly the first choice for students, faculty and staff to pursue their passions and their professional goals. In the last two years, Forbes has named UK among the best employers for diversity and INSIGHT into Diversity recognized us as a Diversity Champion two years running. UK is ranked among the top 30 campuses in the nation for LGBTQ inclusion and safety. The Chronicle of Higher Education judged us a “Great College to Work for,” and UK is among only 22 universities in the country on Forbes' list of "America's Best Employers." We are ranked among the top 10 percent of public institutions for research expenditures — a tangible symbol of our breadth and depth as a university focused on discovery that changes lives and communities. And our patients know and appreciate the fact that UK HealthCare has been named the state’s top hospital for three straight years. Accolades and honors are great. But they are more important for what they represent: the idea that creating a community of belonging and commitment to excellence is how we honor our mission to be not simply the University of Kentucky, but the University **for** Kentucky.*

Diversity Champions



Diversity Champions exemplify an unyielding commitment to diversity and inclusion throughout their campus communities, across academic programs, and at the highest administrative levels.

A limited number of colleges and universities across the nation have been selected for this honor.

Known for visionary leadership, Diversity Champions are institutions that set the standard for thousands of other campus communities striving for diversity and inclusion. They develop successful strategies and programs, which then serve as models of excellence for other institutions. Diversity Champion schools exceed everyday expectations, often eclipsing their own goals.

Selected institutions rank in the top tier of Higher Education Excellence in Diversity (HEED) Award recipients. The HEED Award is presented annually by *INSIGHT Into Diversity* to recognize colleges and universities that are dedicated to creating a diverse and inclusive campus environment.

2019 Diversity Champions

 <p>CLEMSON UNIVERSITY</p>	 <p>COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK</p>	 <p>FLORIDA STATE UNIVERSITY 1851</p>	 <p>INDIANA UNIVERSITY BLOOMINGTON</p>
 <p>MUSC Medical University of South Carolina</p>	 <p>OKLAHOMA STATE UNIVERSITY</p>	<p>RIT Rochester Institute of Technology</p>	 <p>TEXAS A&M UNIVERSITY</p>
 <p>TEXAS TECH UNIVERSITY</p>	<p>UAB THE UNIVERSITY OF ALABAMA AT BIRMINGHAM</p>	 <p>University of CINCINNATI</p>	 <p>University of Kentucky</p>
 <p>UNF UNIVERSITY of NORTH FLORIDA</p>	 <p>UNIVERSITY OF South Carolina</p>	 <p>VCU</p>	 <p>VIRGINIA TECH.</p>

2019 Recipients



Adelphi University
Arkansas State University
Augustana College
Ball State University
California State University, East Bay
California State University, Fresno
California State University, Fullerton
California State University, Los Angeles
California State University Northridge
California State University San Marcos
Case Western Reserve University
Central Washington University
Clemson University
Columbia University in the City of New York
Cuyahoga Community College
Davenport University
DePaul University
East Carolina University
Eastern Washington University
El Paso County Community College District
Florida State University

Santa Rosa Junior College
School of the Art Institute of Chicago
Seminole State College of Florida
Southern Illinois University Edwardsville
State University of New York College at Cortland
SUNY Buffalo State College
SUNY Old Westbury
Swarthmore College
Texas A&M University
Texas Christian University
Texas Tech University
The University of Alabama at Birmingham
The University of Tulsa
Union College, NY
University at Albany – State University of New York
University of Central Florida
University of Cincinnati
University of Colorado Boulder
University of Georgia
University of Houston
University of Houston-Downtown

Framingham State University
Georgia Institute of Technology
Georgia State University
Grand Valley State University
Greenville Technical College
Hillsborough Community College
Indiana University Bloomington
**Indiana University-Purdue University
Indianapolis**
Kansas State University
Kent State University
Lehigh University
Louisiana State University
Maryville University
Metropolitan State University
Metropolitan State University of Denver
Millersville University
Minnesota State
Mississippi State University
North Carolina State University
Northeast Wisconsin Technical College
Northeastern University
Ohio University
Oklahoma State University
Oregon State University
Pikes Peak Community College
Princeton University
Rochester Institute of Technology

University of Houston Law Center
University of Illinois at Chicago
University of Illinois at Urbana-Champaign
University of Kentucky
University of Louisiana at Lafayette
University of Louisville
**University of Maryland School of Public
Health**
University of Michigan – Ann Arbor
University of Missouri-Kansas City
University of North Carolina at Greensboro
University of North Florida
University of North Texas
**University of Pittsburgh of the
Commonwealth**
System of Higher Education
University of South Carolina
University of South Florida
University of West Florida
University of West Georgia
Virginia Commonwealth University
**Virginia Polytechnic Institute and State
University**
Washington State University Vancouver
West Virginia University
Western Michigan University
William & Mary
**William Marsh Rice University (Rice
University)**
Winston-Salem State University

Capilouto Named President of the SEC

By [Guy Ramsey](#) June 4, 2019



UK President Eli Capilouto elected president of Southeastern Conference. Mark Cornelison | UK Photo.

LEXINGTON, Ky. (June 4, 2019) — University of Kentucky President Eli Capilouto has been elected president of the Southeastern Conference.

Capilouto will serve a one-year term after he was elected to the post by his peers at the SEC's annual spring meeting in Destin, Florida, last week. University of Georgia President Jere Morehead will serve as vice president of the SEC.

Capilouto became the 12th president of the University of Kentucky July 1, 2011. Under his leadership, the Commonwealth's flagship and land-grant research university has grown from \$2.7 billion to a proposed \$4.2 billion in total operations for 2019-2020 and has gained significant momentum in fulfilling its multifaceted mission of teaching, research, service and health care.

President Capilouto has led an eight-year, \$2.4 billion re-building of the campus and its athletics facilities. Specifically, through his partnership with Athletics Director Mitch Barnhart, UK has invested some \$300 million in athletics facility construction, renovation and improvement — including a renovated Kroger Field and new Kentucky Proud baseball stadium that opened this past fall.

UK Athletics remains one of the few self-sufficient athletics departments in the country, receiving no state or general funds from the university. In fact, UK Athletics donates millions of dollars back each year to the university's academic enterprise, including funding nearly two-thirds of the \$100-plus million Jacobs Science Building in the heart of the UK campus.

For the 14th consecutive semester, University of Kentucky Athletics has surpassed its goal of a department-wide grade-point average of 3.0. And the NCAA recently released its Academic Progress Rate report, showing that all UK teams surpassed the NCAA cut score. Six teams had perfect scores of 1,000 and were recognized with national awards for being in the top 10 percent of their respective sports.

The University of Kentucky is increasingly the first choice for students, faculty and staff to pursue their passions and their professional goals. In the last two years, Forbes has named UK among the best employers for diversity and INSIGHT into Diversity recognized us as a Diversity Champion two years running. UK is ranked among the top 30 campuses in the nation for LGBTQ inclusion and safety. The Chronicle of Higher Education judged us a "Great College to Work for," and UK is among only 22 universities in the country on Forbes' list of "America's Best Employers." We are ranked among the top 10 percent of public institutions for research expenditures — a tangible symbol of our breadth and depth as a university focused on discovery that changes lives and communities. And our patients know and appreciate the fact that UK HealthCare has been named the state's top hospital for three straight years. Accolades and honors are great. But they are more important for what they represent: the idea that creating a community of belonging and commitment to excellence is how we honor our mission to be not simply the University of Kentucky, but the University **for** Kentucky.*

'Behind the Blue': UK's Corey Baker Bridging Diversity Gap in Computer Science

By **Carl Nathe** Wednesday



LEXINGTON, Ky. (June 12, 2019) — The [University of Kentucky's Department of Computer Science](#) within the [College of Engineering](#) was formed in 1966, making it one of the oldest departments of its kind anywhere in the nation.

Now one of its younger faculty members, Corey Baker, is helping to lead the way for the department in bridging the diversity gap. Baker, who is in his second year as an assistant professor at UK, believes universities must do a better job recruiting, retaining and graduating minority students in engineering. Thus far, his extensive efforts are proving to be very successful.

On this week's episode of "Behind the Blue," UK Public Relations and Strategic Communication's Carl Nathe talks with Baker about student recruitment and about his teaching, research and service.

Become a subscriber to receive new episodes of "Behind the Blue" each week. UK's latest medical breakthroughs, research, artists and writers will be featured, along with the most important news impacting the university.

For questions or comments about this or any other episode of "Behind the Blue," email BehindTheBlue@uky.edu or tweet your question with #BehindTheBlue.

The University of Kentucky is increasingly the first choice for students, faculty and staff to pursue their passions and their professional goals. In the last two years, Forbes has named UK among the best employers for diversity and INSIGHT into Diversity recognized us as a Diversity Champion two years running. UK is ranked among the top 30 campuses in the nation for LGBTQ inclusion and safety. The Chronicle of Higher Education judged us a "Great College to Work for," and UK is among only 22 universities in the country on Forbes' list of "America's Best Employers." We are ranked among the top 10 percent of public institutions for research expenditures — a tangible symbol of our breadth and depth as a university focused on discovery that changes lives and communities. And our patients know and appreciate the fact that UK HealthCare has been named the state's top hospital for three straight years. Accolades and honors are great. But they are more important for what they represent: the idea that creating a community of belonging and commitment to excellence is how we honor our mission to be not simply the University of Kentucky, but the University **for** Kentucky.*

APPENDIX C

2020 KY-WV LSAMP
PROGRAM EVALUATION
SUBMITTED BY
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KY-WVA SLAMP: 2019-2020 Formative Evaluation

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Executive Summary

The KY-WV Louis Stokes Alliance for Minority Participation (LSAMP) Program ([nsf.gov/lsamp](https://www.nsf.gov/lsamp), 2017), funded by the National Science Foundation, aims to enhance the participation of underrepresented racial and ethnic minority (URM) populations in STEM academic majors and careers. Specifically, the current funding cycle continues to build on the previous success, while addressing any unresolved challenges and the most recent COVID-19 campus shutdown.

The most significant themes emerging from this year's site visits are grouped into three major categories: (1) sharing "promising policies and practices", (2) restructuring the Symposium, (3) implementing more formal graduate and professional studies information sessions, (4) providing more off-campus summer research experiences, and (5) presentations at scientific conferences.

Recommendations tended to vary by stakeholder group. Scholars suggested the following: (1) restructuring the content of the Symposium, and (2) more career and graduate studies recruiters at the Symposium. Non-scholars called for: (1) more interaction involving sharing of "promising practices and policies", (2) more input from coordinators in the timing and location of the Symposium, and (3) strategies to secure funds to supplement the LSAMP budget allocations.

Education Research Project. Though not entirely the fault of the research team, this component is off to a slow start. At the time of this year's evaluation, the first survey had been administered, but no analysis had occurred. The research team planned to request a change in "timetable" because the original timelines were deemed unreasonable given the initial experiences in data collection.

Purpose. The primary purpose of this formative evaluation report is to assess the extent to which the KY-WV Alliance (<https://www.uky.edu/kywv-lsamp>) is accomplishing the goals and objectives outlined in its most recent proposal, covering academic years 2018-2023.

Introduction

While there continues to be some measurable progress, African Americans, Hispanics and American Indians (underrepresented racial/ethnic minorities or URMs) continue to be underrepresented at each stage along the science, technology, engineering and mathematics (STEM) educational pathway and the workforce (Hrabowski and Henderson, 2017; 2019; National Academies, 2018; 2016; National Center for Science and Engineering Statistics, 2019; National Science Board, 2018; Slaughter, Tao and Pearson, 2015; Pearson and Miller, 2012; Committee on Equal Opportunities in Science and Engineering, 2011). A plethora of federal and private foundation efforts have been implemented to increase the participation of URMs in STEM disciplines and careers (BEST, 2004; National Academy of Sciences,

National Academy of Engineering, and National Institute of Medicine, 2011). There is strong evidence that high-quality undergraduate research experience and mentoring play significant roles in recruiting and retaining URMs in STEM disciplines and careers (Leggon and Pearson, 2010; Chemers et al., 2011; Ghee et al., 2014; Leggon and Gaines, 2017).

This report is organized in four sections: (1) Methodology; (2) Findings from site visits, surveys, and research study; (3) Conclusions; and (4) Recommendations.

Methodology

This formative evaluation plan calls for data collection using a mixed method approach--quantitative and qualitative data (Frankfort-Nachmias and Leon-Guerrero, 2015; Babbie, 2014; Berg and Lune, 2012; Neuman, 2011; Frechtling, 2010; Clewell and Fontenberry, 2009). As was the case last year, in conjunction with the Administrative Director, three public partner institutions of various Carnegie classifications, geographical location, and Scholar demographic composition were selected for case studies. However, visits to one of the selected sites was postponed because the newly-appointed campus coordinator needed more time to implement the program. Unfortunately, the identity of one of this year's sites was accidentally breached in an Alliance agenda. This negates the tradition of anonymity in which institutions are identified as Institution A, Institution B, etc. Consequently, this year's evaluation report aggregates data from the two institutions.

Quantitative data were largely obtained from the scholar surveys. Additional quantitative data were derived from scaled items in the scholars' focus groups, and coordinators' reports of program demographic information. Survey response patterns were negatively impacted by the March campus shutdowns resulting from the COVID-19 "shelter in place" policies. Some scholars lived in rural areas with limited or no access to the Internet, others did not have access to commercial Internet services, and others were pre-occupied with the transition to online instruction. In addition to a low overall survey response, significant variation in rates occurred across institutions, some of which were not deemed acceptable statistically. Consequently, the evaluators decided to aggregate all surveys to generate a more acceptable response rate across institutions of at least 30 percent. This resulted in an overall response rate of 33% completing useable surveys (N=78). While attempting to increase the response rate by sending additional waves of the online survey, the evaluators became aware that the researchers were trying to increase their survey response rate by offering completers a potential \$50 gift card. As discussed in the Scholars' section, there was considerable confusion regarding the actual offered or proposed gift card. The evaluation survey did not offer any compensation. Given the response rate, the survey findings should be reviewed with caution.

Qualitative data were derived from interviews and focus groups of LSAMP program staff (N= 5; 100% response rate), university administrators (N=3;100% response rate), faculty research mentors (N=3; 100% response rate), and scholars/participants (N=19; 90% response

rate). Separate phone interviews were conducted with each of the two researchers. The findings of *Year 2* activities are presented below.

Informed consent. All subjects were informed of their rights as human subjects. All subjects signed a form giving their consent (or gave verbal consent) for interviews to be audio taped. All tapes were transcribed verbatim without personal identifiers by a third-party, professional transcriptionist. The transcripts were analyzed for critical themes by two experienced evaluators. In compliance with the confidentiality agreement, every effort has been made to avoid the identification of any respondent and partner institution; therefore, some responses are presented in general terms. Surveys included a consent statement. What follows is a discussion of findings of this year's formative evaluation. The first section highlights the major findings of interviews conducted with program staff, university administrators and mentors as well as focus groups with Scholars.

Findings

Site Visits. The arrangements for the on-site and virtual site visits were exemplary. In fact, the on-sight scheduling should be the model for future evaluation visits.

Program Staff. All staff have a clear understanding of the goals and objectives of the LSAMP program. When asked if they received an orientation for their roles, they indicated some form—mostly from the Alliance Director's PowerPoint presentation during campus visits or online posts, and the annual Retreat and Symposium. Overall, staff were satisfied with their compensation. All reported additional non-LSAMP job responsibilities or wearing several "hats." Among their LSAMP responsibilities are: (1) day-to-day program operations, (2) communicating with Scholars, mentors, and institutional administrators, and (3) developing and implementing program activities. When asked if they have sufficient resources to meet the goals and objectives as outlined in the grant, most staff agreed with a colleague who said: "I think we can meet them, but we would like to do better than that. It is particularly challenging to do all the things we would like to do." All reported that because the Alliance grant allocations are limited, they have managed to leverage additional resources by reaching out to campus officials and researchers. Staff describe their positions as fluid but vital to accommodate the needs of the Scholars. One interviewee explains:

It's great to have STEM majors, but we want to make sure that they actually leave the institution with a degree. Also making sure that we support them throughout that process. Helping them to feel like there is a sense of community or belonging. Based on our experiences, we know that if Scholars don't feel like they're connected to the university, then that disconnect starts to impact their academic performance. We work hard to make sure that Scholars have all of the support that they need to be able to make it from that first year to graduation. Additionally, we provide them with resources to support them in their graduate or professional school journey. We really focus on developing a quality Scholar, which is one of the key points that LSAMP pushes.

When asked if the Scholars understand the goals and objectives of the program, coordinators agreed with a colleague's summation: "Depending on their classification, the answer may be different. First year Scholars would probably say, '*To help me get a STEM degree*'. Scholars who have participated in the program a number of years will be able to include personal and professional development as well as the intentionality of pursuing graduate studies. When it comes to program orientation for Scholars, sites tend to offer both individual and group activities. Both sites use some form of online application that includes program requirements. The two reported different challenges regarding recruiting and retention. One site indicated that despite considerable outreach to classes and emails, students expressed an interest but failed to apply. One staffer comments, "...the meetings scheduled but they don't show up...then, I re-schedule the meeting and they still don't show up! When I speak to the classes, the students act like they are really interested but they just don't fill out the application. We have more students who are eligible, but I just can't get them to apply! Or, they'll submit an application but not come to meet with me." The staffer adds: "The few who do apply tend to remain in the program."

Conversely, the other site enjoys robust application submissions but is challenged keeping Scholars actively engaged in the program. A staffer had this to say:

Usually, there are no issues recruiting Scholars because the first thing they hear about it is the stipend. The main issue comes in keeping them engaged. You tell them the requirements to get the stipend and then you ask them if it's feasible and they say yes it's feasible. But then you get to the end of the semester, and the majority of them don't meet the requirements. But even when they do meet the requirements, some are limited by inadequate financial aid.

To better understand the problem, the site conducted a needs assessment. The results are being used to revise meeting times and develop or revise activities that better meet the needs of Scholars. This site has found success by building relationships with academic advisors. The academic advisors inform STEM majors about our program. This practice has contributed to the increase in applications and subsequently to the number of Scholars. Unfortunately, there are insufficient funds to support the growing interest.

When asked to assess the 2019 summer research and the 2019-2020 academic year research activities, staff at both institutions indicated high levels of satisfaction. One staffer recalled: "The ones who participated in summer research did some really interesting work. However, we would like to see more of our Scholars engaged in summer research." During the interviews, the evaluators discovered that some Scholars who reported having no summer research experience actually did. Unfortunately, they were unaware that research is not confined to a university lab. The staff is addressing this misunderstanding.

Most of the Scholars are involved in some level of research during the academic year. One coordinator emphasized: "We have been more intentional about having conversations about the importance of the research experience; as a result, more Scholars are taking advantage of it."

Even with first year Scholars wanting to know how to get involved in research, this doesn't mean that the program is where it needs to be."

The sites reported a range of academic support provided to Scholars. Both sites offer some form of tutorial and supplemental services. Some of these services were institutional services. However, programs had limited funds to provide their own tutors. Other support included purchasing books for those who cannot afford books for their classes. At one site, assistance with GRE fees and loaner laptops are available. At both sites, Scholars have taken advantage of attending a professional development conference.

When asked about their interaction with Alliance partners, the most common response was: "We really don't have a lot of interaction or collaboration outside of the annual Symposium or Retreat. At most, we only see each other twice a year. Most of our contact is with the Director. Occasionally, we have contact with the other coordinators when seeking collaboration on a grant proposal. Our communication is somewhat limited because of our geographical dispersion." One staffer pointed to the fact that most of them have other campus job responsibilities that limit their opportunities to be more engaged.

When asked what could be done better to enhance the functioning as an Alliance, much attention was on the Symposium. (As will be discussed below, this was also a 'hot button' issue for some Scholars.) There should be more intentional conversation among coordinators at this year's retreat regarding the location and content/agenda offerings of the Symposium. At Marshall, program staff received numerous complaints from Scholars regarding the rooming policy of Scholars sharing beds with what the categorized as "strangers." Responding to the complaints, the practice was abandoned for this year's Symposium at Kentucky State University. Both Scholars and coordinators praised the quick decision.

There was acknowledgement that the Director does an excellent job communicating with campus coordinators for everyone to work together. There was also the recognition that campus coordinators should play a more active and timelier role in responding to the Director's request for feedback on a variety of Alliance matters.

When asked about the research mentors' understanding of the goals and objectives of the program, the consensus was that they have basic knowledge. However, they mentioned that more outreach to mentors is needed for them to have a more in-depth knowledge of the program. There was agreement that during the academic year, it is somewhat easier to place Scholars because most faculty members are on campus. Apparently, faculty mentors who do not get paid over the summer do not take Scholars into their labs; previously, this was especially a challenge at small institutions. One Scholar emphasized the transformative nature of the research experience: "I had a couple of cases where Scholars start out with a goal of being premed or they want to be a physician's assistant or something along those, but once they start getting research opportunities, they tend to change their mind. One Scholar went from being interested in a career as a physician's assistant to falling in love with research."

Mentors. All mentors had a general understanding of the program goals and objectives. Typically, they mention:

- Increasing the number of minorities receiving STEM degrees, including post-graduate STEM degrees
- Increasing minority researchers
- Building community within the group
- Supporting Scholars in their academic success

When asked whether the Scholars understand the goals of the program, most mentors answered in the affirmative. One mentor recalled: “From my daily interaction ... they (Scholars) understand the goals.” The mentor adds: “My feeling is that this program is really great. They probably should expand the program. I think it is really good because without this program, I really don’t know if my student could have achieved _ goal ... One year after _ finished training in my lab, __ got a scholarship to go to __ (prestigious lab) for extended training. This indicates that __’s research experience is really deeply motivated in this area.”

When asked about preparedness of Scholars to engage in research, all mentors said it is variable. One mentor captures the groups’ comments:

It just depends on their preparation in high school. Some Scholars come to us very well prepared from their public school education, while other Scholars come to us not prepared at all. Being prepared for the laboratory is really highly dependent on how prepared they were in high school. If a student is not well-prepared in high school, they have to remediate some courses. The Scholars who come out of some of the high schools here and are well-prepared can dive right into those science classes and then they are very well-prepared to get into the lab. We see Scholars who come out of some rural counties who graduate with a 3.5 GPA, but their preparation was not rigorous.

However, one mentor pointed out that if a grant proposal includes a request for an undergraduate to have a summer research experience—it has a distinct advantage over an academic-year research experience. “It’s a challenge because the undergraduate student needs more training. That’s why the summer research program is good for them. They can immerse themselves the whole day in the lab. During the academic year, they have to juggle two hours here, two hours there. And then they have to leave for class and come back to the lab. During the summer, they can concentrate everything on research.”

Senior Administrators. All administrators had some form of orientation to the LSAMP program. The administrators indicated that the coordinator or staff does an incredibly good job of educating our administrators and research mentors on the goals and objectives. Some of the administrators had first-hand knowledge about the program because they had been actively involved in the early Phases of the KY/WV Alliance. Indeed, one administrator had attended a previous LSAMP coordinator meeting. All administrators had long-standing personal and professional commitments to equity and were vocal supporters of LSAMP and related programs.

There was agreement among administrators that Scholars gained tremendous benefits from their research experiences. One administrator explained: “Just from being a student in a laboratory, you get a deeper understanding of scientific concepts that you can’t possibly get in the classroom. So, it is inevitable that Scholars engaged in research—freshmen up to senior, get real hands-on research experience. This experience also enhances classroom performance.”

One administrator cautioned about the routine use of the acronym. “Every once in a while, other administrators and some faculty will ask what is the meaning of the acronym. Instead of just saying, ‘Louis Stokes Alliance for Minority Participation’, we probably overuse the acronym. However, they understand the tenets of the program but may not always know what the full name.

In the next section, we focus on the experiences of the Scholars.

Scholars. All Scholars were able to articulate the program goals and objectives, and Scholars’ responsibilities. When asked about the greatest benefits of the program, Scholars offered the following:

- Conducting own research
- Build relationships with professors on campus
- Stipend
- Research external to own university
- Connections with Scholars from similar backgrounds with similar goals
- Builds a sense of community
- Opportunity to attend conferences
- Career and graduate school fairs

Some Scholars (mostly first- and second-year) argue that there should be more discussion about the relationship between undergraduate research and preparation for graduate school. One scholar’s comments are relevant: “I have no idea how to go about applying to or the procedure for selecting a grad school. And I don’t have a lot of guidance on that.” However, another Scholar offers this opinion: “They (program staff) post lots of links to the website about multiple types of research opportunities... For details and information about graduate schools, we can go to the office.”

When asked whether they have evaluated program staff, there was some confusion. A majority of Scholars said no. But, one Scholar pondered: “I think we completed an evaluation of the overall program (Alliance) itself, but not over our campus staff.” Another Scholar recalled: “I completed an online survey but I’m not sure exactly who it went to.” Yet, another Scholar speculated that the survey link “was sent by Fara...I believe.” Yet, another Scholar reported receiving an email about receiving \$50 gift card for completing a survey...” Not surprisingly, the potential of a \$50 offer prompted questions from others as to where they can find the link to gift card offer. One Scholar was confused about whether a survey came from Fara or someone else...” Based on interviews with some coordinators and other program staff, much of the

confusion appears to be related to an email from the Director appealing to Scholars to complete different surveys from the external evaluators (1) and researchers (2).

When asked for suggestions to improve the program, the most common responses were:

- Better interaction between staff and Scholars
- More dedicated LSAMP staff
- More external research opportunities

When asked what they could personally do to improve the quality of the program, the following comments were made:

- More active participation, especially in the study session
- Recruit classmates
- Mentor first-year Scholars
- Maintain high-level academic and research performance

Regarding the least helpful program components, most Scholars struggled to identify any. Below are the three that were offered:

- It can be limiting if you are not interested pursuing grad school
- Limited focus on pursuing jobs after receiving the bachelor's degree
- Limited focus on pre-med and pre-health careers and professional schools

Symposium. A substantial majority of Scholars attending this year's Symposium rated their experiences as "very good or good" (See Survey discussion below). Scholars were highly complementary of this year's location. One Scholar captures the groups' sentiment: "This year was really nice because the Symposium was held at Kentucky State University." However, a *vocal* minority (mostly previously attendees) were critical of some components of the event. The criticism centered around the presenters and structure. Representative comments follow:

Presenters.

- "I rated it poorly because the speaker said 'if you are a senior and just getting into research, it's too late.' A lot of us are graduating seniors and found the comment discouraging."
- "This is my _ year attending. With the possible exception of one other school, I think all of the student panelists were from UK. We're just kind of like the audience."
- "I don't think it's really effective for anybody."

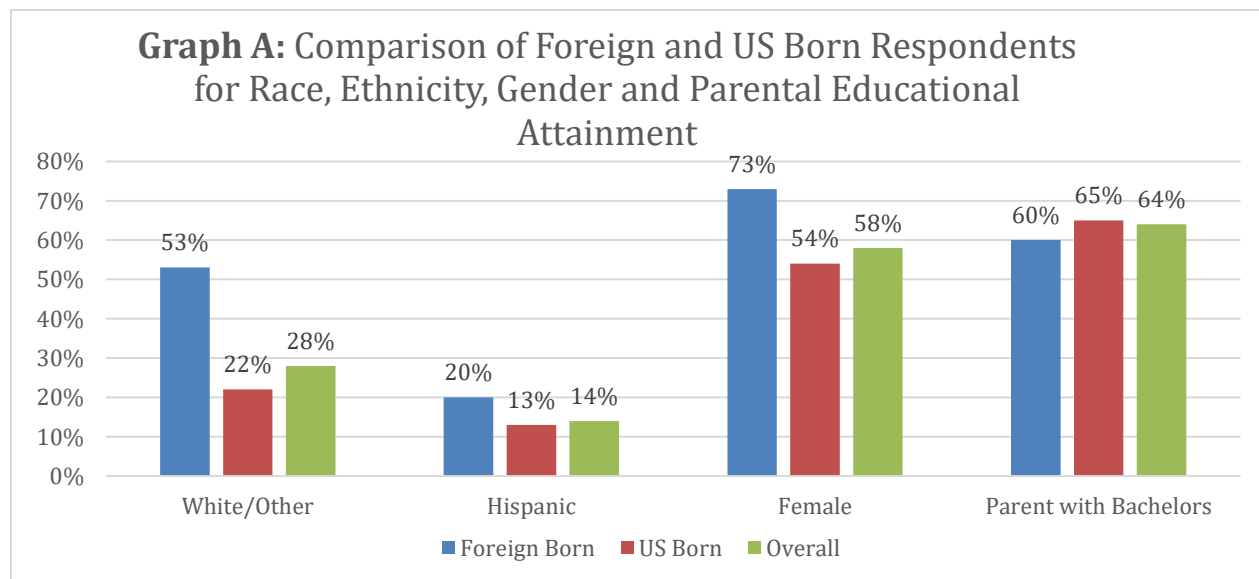
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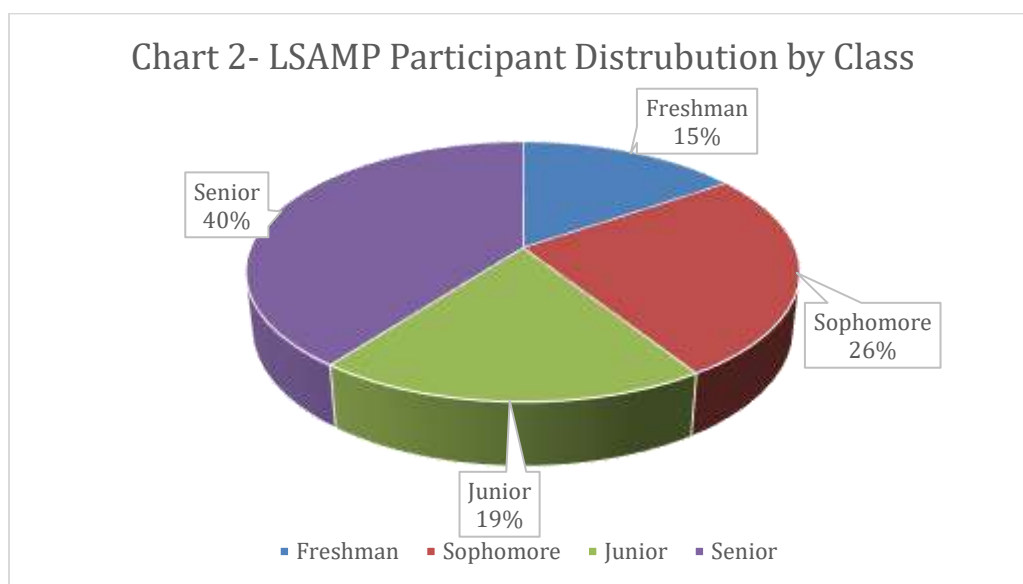
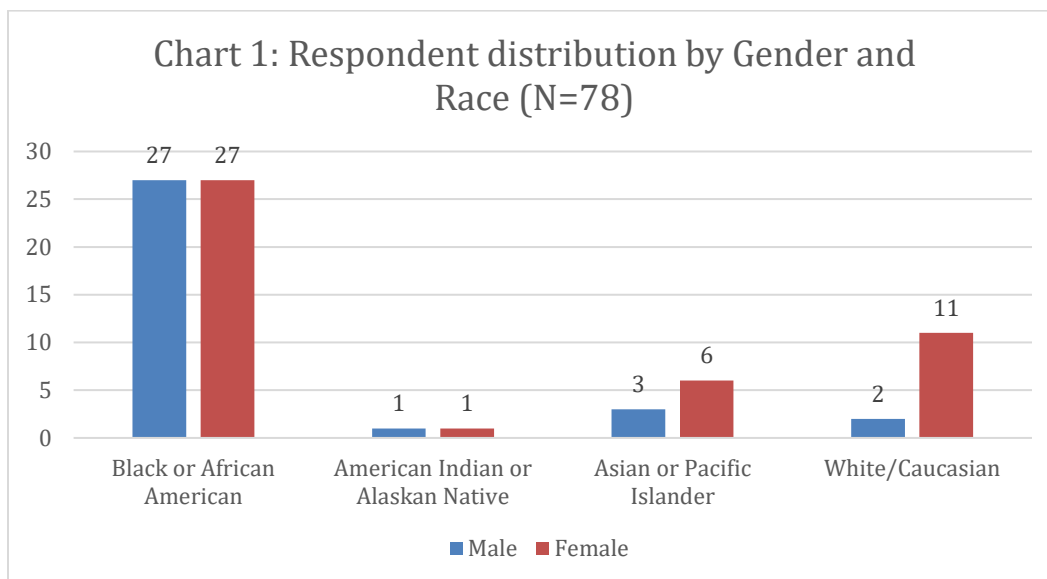
- "The program was scheduled to end at 9:00 PM but went way overtime. I don't think a lot of people were really mentally prepared to focus on anything that late."
- "When we were at Marshall the year before, the Marshall Scholars staffed the registration table. But, everything after that was dominated by UK."
- "At Marshall, the *study abroad* panel was comprised of only UK Scholars."

- “Another issue is when we arrive for the first activity, we were told: ‘we’re not going to give you your keys until the end of the night.’ So, we have to sit here at dinner with all of our luggage at our table. There is no reason why we could not put our stuff in our room and come back down.”
- The Symposium consists primarily of lecture sessions. “The only time we get to interact is when the program is over. There’s not a lot of down time to interact and engage in conversation with Scholars from the same or other schools. There should be *break out* groups.”

Scholar Survey

Demographics. There were 78 respondents to the LSAMP participant survey, with approximately 42% self-identifying as male and 58% as female. **Chart 1** represents the racial distribution of respondents. The majority of respondents racially identified as Black/African-American (69.2%) with an equal distribution of males and females at 35% each, followed by White/Caucasian (16.6%, Female =85%), Asian/Pacific Islander (11.5%, 67% Female) and Native-American/Alaskan Native (2.7%, 50% Female). In terms of ethnicity, 14% of respondents self-identified as Hispanic, 72% as women. As shown in **Chart 2**, the majority of the respondents were seniors (39.7%), with freshmen in the minority (15.4%). **Table 1** provides a distribution of respondents by classification, gender, and ethnicity. All but one of the respondents were United States Citizens or Permanent Residents, with 19% being foreign-born. Most foreign-born respondents self-identified racially as White/Other (67%) and ethnically as non-Hispanic (67%) (See Graph A below). Respondents indicated that at least one of their parents held a bachelor’s degree at a rate of 63%, the majority of whom were Black (59%), while ethnically, 27% of respondents identifying as Hispanic reported the same. It should be noted that the racial category of White/Caucasian has been combined with that of Asian/Pacific Islander and is depicted as White/Other, primarily because both classifications are not considered under-represented minorities (non-URMs) within STEM fields.





College major. **Tables 2 and 3** illustrate intended and current college majors by gender, race, and ethnicity. Prior to entering college, all respondents with the exception of one intended to major in a STEM field, predominantly in the life sciences (40%), followed by engineering (19%). The subgroup of Black females (15%) composed a majority of the intended majors in life sciences, followed by White/Other females at 10%. Racially, life sciences majors predominated with White/Others (45%) and Black (37%). In contrast, Hispanics reported an intended life sciences major at a noticeably lower rate of 18%, with a majority (36%) having an intended major of engineering, 75% of whom were female.

	Black/African American	American Indian or Alaskan Native	Asian or Pacific Islander	White/Other	Hispanic
Freshman Male	4	1	1	2	2
Freshman Female	2	0	1	1	1
Sophomore Male	7	0	0	0	0
Sophomore Female	9	0	1	3	3
Junior Male	7	0	1	0	1
Junior Female	6	1	0	0	0
Senior Male	9	0	1	0	0
Senior Female	10	0	4	7	4
Total	54	2	9	13	11

	Black/Other*			White/Other			Hispanic		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Agricultural Sciences	0	0	0	1	0	1	1	0	1
Chemistry	4	5	9	0	3	3	0	3	3
Computer Science	7	4	11	0	0	0	0	0	0
Engineering	6	5	11	1	3	4	1	3	4
Environmental Science	0	0	0	0	1	1	0	1	1
Life/Biological Sciences	9	12	21	2	8	10	1	1	2
Mathematics	1	1	2	0	1	1	0	0	0
Other	0	0	0	1	0	1	0	0	0
Physics/Astronomy	0	0	0	0	0	0	0	0	0
Social Science	1	1	2	0	1	1	0	0	0
	28	28	56	5	17	22	3	8	11

*Rather than creating a separate racial category for the 2 Native Americans/Alaska Natives, they are included with African Americans.

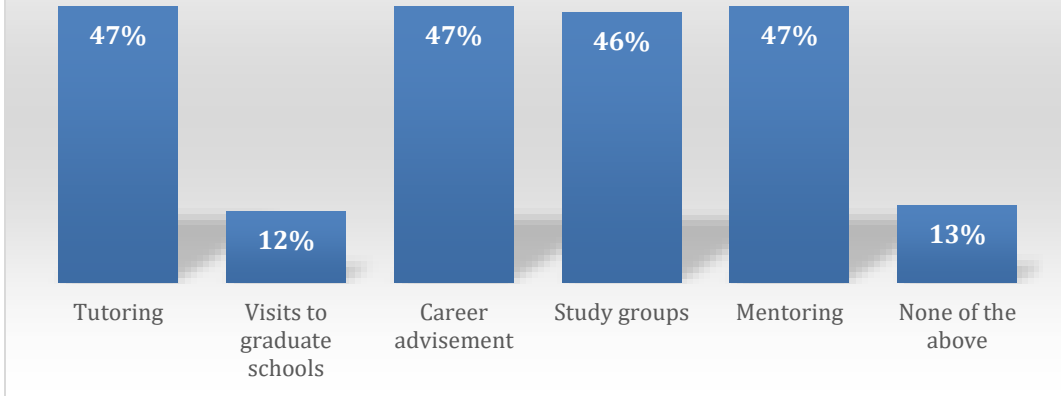
	Black/Other*			White/Other			Hispanic		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Agricultural Sciences	0	1	1	1	0	1	1	0	1
Chemistry	3	7	10	0	2	2	0	2	2
Computer Science	8	4	12	0	0	0	0	0	0
Engineering	6	5	11	2	3	5	1	3	4
Environmental Science	0	0	0	0	1	1	0	1	1
Life/Biological Sciences	10	9	19	2	6	8	1	1	2
Mathematics	1	1	2	0	1	1	0	0	0
Other	0	0	0	0	3	3	0	1	1
Physics/Astronomy	0	0	0	0	0	0	0	0	0
Social Science	0	1	1	0	1	1	0	0	0
	28	28	56	5	17	22	3	8	11

*Rather than creating a separate racial category for the 2 Native Americans/Alaska Natives, they are included with African Americans.

Respondents changed their major at a rate of 26% once matriculating into college, a majority of whom (85%) were Black or Hispanic; however, all but one respondent remained in a major classified as a STEM field by the National Science Foundation, with 85% remaining in a related field (i.e. biology to neuroscience). Half of the respondents who changed their major did so in their first year.

Activities and Support Services. When asked how they learned about the Kentucky/West Virginia LSAMP, most reported from a professor (45%) or peer (28%). **Chart 3** depicts the overall respondent participation in select LSAMP related activities. Participation rates were similar (46-47%) for tutoring, career advisement, study groups and mentoring; however, the rate was noticeably lower for participation in graduate school visits at 12%. A noticeable difference was observed in terms of participation in study groups with disaggregation, being higher (57%) for Blacks, as compared to Hispanics (27%) and White/Others (17%). **Chart 4** depicts the perceived benefit of select LSAMP activities by respondents. The perceived benefit of STEM career advisement was most highly rated as “*beneficial*” or “*very beneficial*” at a full 95%, with mentorship being rated the lowest at 70%.

Chart 3: Overall Participation in LSAMP Sponsored Activities (N=78)



Nearly half (49%) of the respondents attended this year's Symposium. Of these, slightly more than a third (37%) reported presenting.

Chart 4: Perceived Benefit of LSAMP Activities (Beneficial or Very Beneficial)

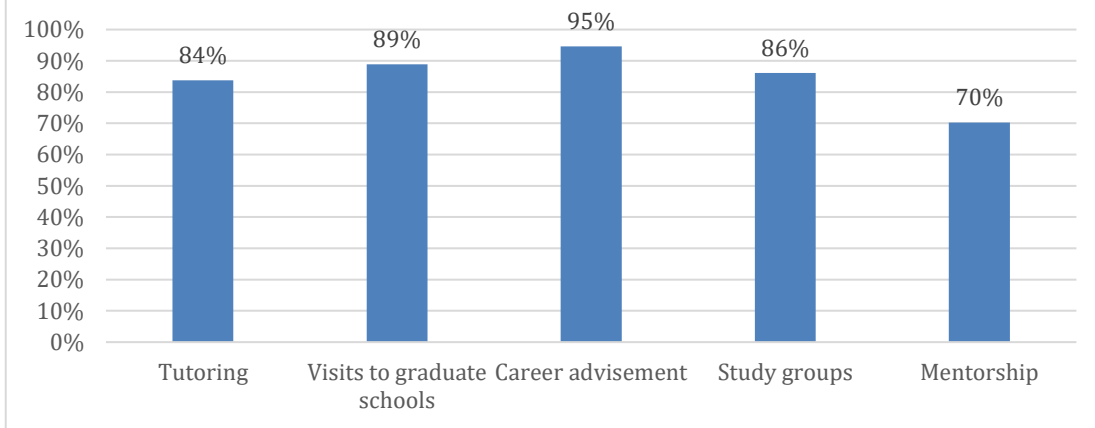
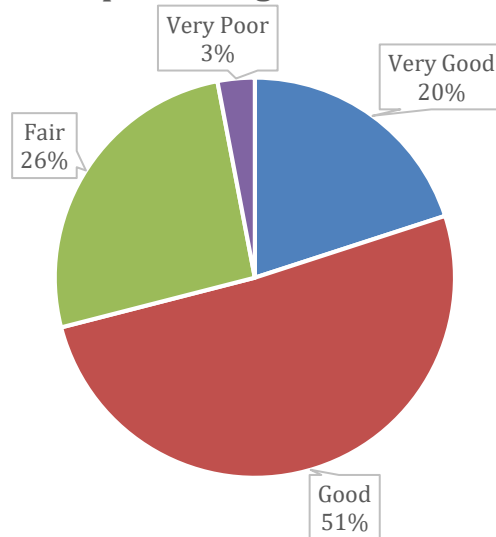


Chart 5: LSAMP Participant Rating of 2020 KY-WV LSAMP Symposium



As represented in **Chart 5**, a majority (51%) of the respondents rated the symposium as “good.” *The following recommendations were provided by respondents:*

- *“More information about the graduate school application rather than addressing the basic/common information.”*
- *“Need speakers who actually started and ended in STEM fields.”*
- *“Shorter conference time and more broadly applicable speakers.”*
- *“It was extremely boring and long. A lot of things didn’t apply to me and it was uninteresting to hear about grad school the entire time.”*
- *“I would recommend changing the rooms occasionally so that the conference does not seem extremely long.”*
- *“Create multiple spaces for topics that students are majoring in.”*

Academic Experiences. It was indicated that 70% of respondents were “satisfied” or “very satisfied” with their overall academic performance in 2019-20. For respondents taking science courses, 67% indicated that they were “satisfied” or “very satisfied” with their academic performance, which was almost identical to that of mathematics at 68%. **Table 4** provides average ratings of how prepared respondents perceive themselves to be for advanced coursework in their major on a scale of 1 to 5, with 5 being the highest, generating an average overall rating of 3.96. Blacks rated themselves highest at 4.01, with White/Others (3.86) and Hispanics (3.82) being similar. As provided in **Table 5**, when asked for a similar rating in terms of preparation for graduate level coursework, respondents gave an average overall rating of 3.46. Hispanics rated themselves highest at 3.54, followed by White/Others at 3.27 and racial URM the lowest at 3.16. Of note, senior respondents rated themselves slightly higher than all groups in perceived preparation for graduate school coursework at 3.64.

Table 4: Self Rating of Preparation for Advanced Coursework in Major by Race and Ethnicity (N=78)	
	Rating
Overall	3.96
Black/Other*	4.01
White/Other	3.86
Hispanic	3.82
*Rather than creating a separate racial category for the 2 Native Americans/Alaska Natives, they are included with African Americans.	
Table 5: Self Rating of Preparation for Graduate Coursework by Race and Ethnicity (N=78)	
	Rating
Overall	3.46
Black/Other*	3.16
White/Other	3.27
Hispanic	3.54
*Rather than creating a separate racial category for the 2 Native Americans/Alaska Natives, they are included with African Americans.	

There was no notable difference between males and females in terms of perceived preparation for advanced or graduate coursework. Respondents on average rated “*quality of instruction in major courses*” at 3.89 and “*Overall education received at current institution*” at 4.0.

Research Experience. During the summer 2019, respondents indicated participation in research at a rate of 25%, with representation being higher for females (55%) than for males (45%). Summer research experiences were located at the home institution for 75% of respondents. When disaggregated by race and ethnicity, racially, Blacks had the lowest rate of summer research participation at 21%, followed by White/Others (36%) and Hispanic at the highest (45%). Overall, 100% of respondents participating in summer research were “satisfied” or “very satisfied.” During the 2019-20 academic year (AY), the research participation rate was noticeably higher than that of the summer at 45%, with female (57%) participation being higher than of males (43%). When disaggregated by race and ethnicity for the academic year, Blacks again had the lowest rate of research participation at 43%, followed by Hispanics (45%) and White/Others with the highest (50%). Overall, 91% of respondents participating in AY research were “satisfied” or “very satisfied.” When asked to rate their research skills on a 5-point scale, respondents provided an average rating of 3.63, with females (3.63) being similar to that of males (3.7). As presented in **Table 6**, respondents cited faculty members as having played the most significant role in securing research experiences both in the summer (43%) and during the academic year (55%).

Table 6: Person Most Significant in Securing Research Experience				
	Academic Year 2019-20 (N=35)		Summer 2019 (N=20)	
	Percentage	Count	Percentage	Count
LSAMP staff	28%	10	30%	6
Faculty member at your college	43%	15	55%	12
College Administrator (non-LSAMP)	0%	0	0%	0
Self	23%	8	15%	3
Peer	3%	1	0%	0
Other	3%	1	%	6

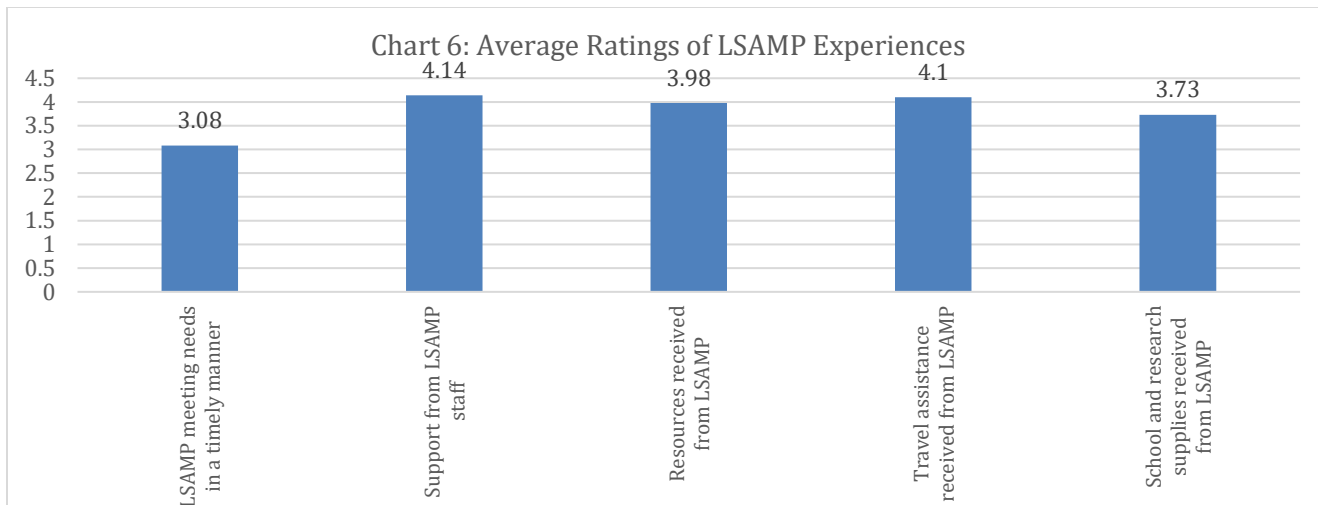
Respondents indicated low rates of attending conferences during the summer, with just 8% doing so, a majority of whom were females (67%). However, a full 83% of summer conference attendees presented. Academic year conference attendance was noticeably higher at 40%, with the majority again being female (71%); however, the presentation rate was lower than that of the summer at 58%.

Postsecondary Plans. Some 96% of respondents planned to pursue an advanced degree, with 80% planning to apply for graduate school in science or engineering. **Table 7** indicates highest degree aspirations for respondents, disaggregated by race and ethnicity. Overall, 32% of the respondents plan to pursue a MD or MD/PhD, with the highest rate being similar for both White/Others and Hispanics at 36%, followed by Blacks at 32%.

Table 7: Highest Degree Aspiration by Race and Ethnicity (N=78)								
Degree	All Respondents	Percent	Black/Other*	Percent	White/ Other	Percent	Hispanic	Percent
Bachelors	3	4%	2	4%	1	5%	1	9%
Masters	28	36%	22	39%	6	27%	4	36%
MD or MD/PhD	25	32%	17	30%	8	36%	4	36%
PhD	19	24%	14	25%	5	23%	1	9%
Other	3	4%	1	2%	2	9%	1	9%

*Rather than creating a separate racial category for the 2 Native Americans/Alaska Natives, they are included with African Americans.

General Responses. Overall, on a scale of 1 to 5 with 5 being the highest, respondents rated their overall LSAMP experience as 4.16, with males (4.36) rating the experience higher than females (4.0). **Chart 6** provides average ratings of respondents for select LSAMP experiences on a scale of 1 to 5, with 5 being the highest. The lowest average rating was given for “*LSAMP meeting needs in a timely manner*” (3.08) and the highest for “*Support from LSAMP staff*” (4.14). All respondents reported that they would recommend the LSAMP Program to a peer.



Summary

- A majority of participants were African-American, very few were Native American/Alaskan Natives. In addition, the majority of participants were not first-generation-to-college, and a noticeable number were foreign born. Females outnumbered males.
- Overall, the rate of participation in research was low, particularly in the summer. However, they were highly satisfied with their research experiences. Research opportunities were primarily identified by respondents themselves, or faculty members at their institution. Attending professional conferences was higher in the academic year than during the summer.
- Overall, LSAMP participants did not rate themselves low in terms of satisfaction with academic performance, although they were less satisfied with performance in science and math courses. Nearly all participants intend to pursue an advanced degree, primarily in science and engineering, although self-perceived readiness for advanced and graduate coursework was not high. Almost all participants entered college with an intended STEM major, and those who changed majors predominantly remained in a related STEM field. However, a majority of individuals who changed majors were racial URMs. Life science majors dominated, except among Hispanics where it was engineering, most of whom were female. Participants did not rate instruction at their respective institutions low and rated their ability to complete a bachelor's degree high.
- Overall, racially, and ethnically, long-term degree aspirations placed MD or MD/PhD at noticeable higher rates than the PhD.
- Participants rated their LSAMP experience highly, with males rating their experience slightly higher than females. Participants indicated a strong willingness to recommend LSAMP to a peer.

Research Experience. During the summer 2019, respondents indicated participation in research at a rate of 25%, with representation being higher for females (55%) than for males (45%). Summer research experiences were located at the home institution for 75% of respondents. When disaggregated by race and ethnicity, racial URMs had the lowest rate of summer research participation at 21%, followed by White/Others (36%) and Hispanic at the highest (45%). Overall, 100% of respondents participating in summer research were “satisfied” or “very satisfied.” During the 2019-20 academic year (AY) the research participation rate was noticeably higher than that of the summer at 45%, with female (57%) participation being higher than of males (43%). When disaggregated by race and ethnicity for the academic year, racial URMs again had the lowest rate of research participation at 43%, followed by Hispanics (45%) and White/Others with the highest (50%). Overall, 91% of respondents participating in AY research were “satisfied” or “very satisfied.” When asked to rate their research skills on a 5-point scale, respondents provided an average rating of 3.63, with females (3.63) being similar to that of males (3.7). As presented in **Table 6**, respondents cited faculty members as having played the most significant role in securing research experiences both in the summer (43%) and during the academic year (55%).

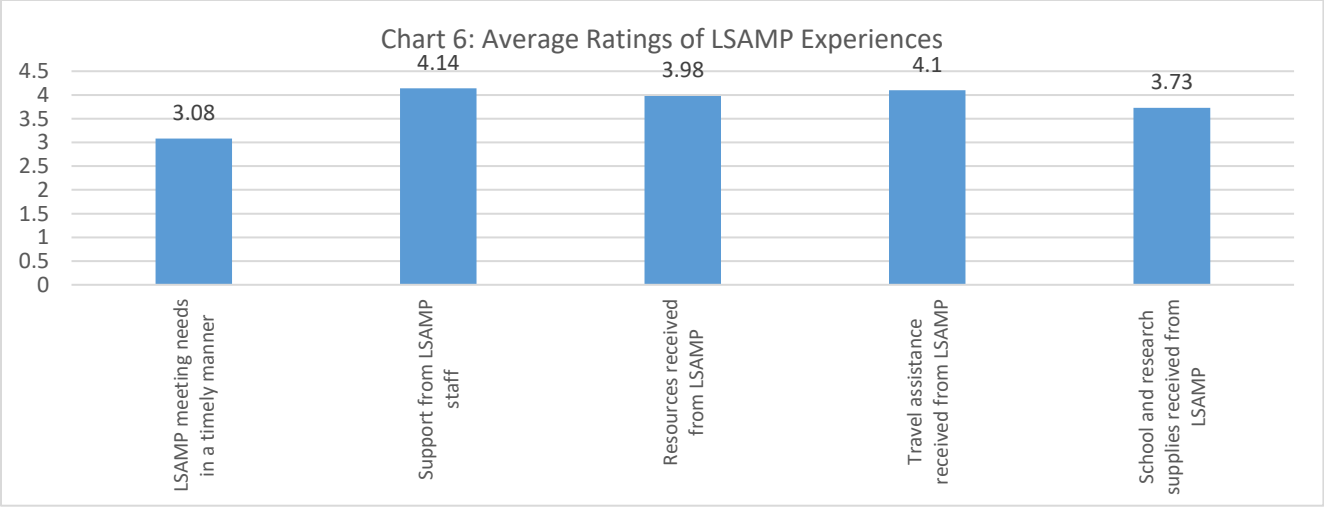
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Respondents indicated low rates of attending conferences during the summer, with just 8% doing so, a majority of whom were females (67%). However, a full 83% of summer conference attendees presented. Academic year conference attendance was noticeably higher at 40%, with the majority again being female (71%); however, the presentation rate was lower than that of the summer at 58%.

Postsecondary Plans. Some 96% of respondents planned to pursue an advanced degree, with 80% planning to apply for graduate school in science or engineering. **Table 7** indicates highest degree aspirations for respondents, disaggregated by race and ethnicity. Overall, 41% of the respondents plan to pursue a PhD or MD/PhD, with the rate being highest among racial URMs (43%), followed by White/Others at 37% and Hispanics at 36%. Overall, 15% of respondents indicated the pursuit of an MD, with the rate being highest among White/Others (23%), followed by racial URMs (13%) and Hispanics (9%).

Degree	All Respondents	Percent	Racial URMs	Percent	White/Other	Percent	Hispanic	Percent
Bachelors	3	4%	2	4%	1	5%	1	9%
Masters	28	36%	22	39%	6	27%	4	36%
MD	12	15%	7	13%	5	23%	1	9%
MD/PhD	13	17%	10	18%	3	14%	3	27%
PhD	19	24%	14	25%	5	23%	1	9%
Other	3	4%	1	2%	2	9%	1	9%

General Responses. Overall, on a scale of 1 to 5 with 5 being the highest, respondents rated their overall LSAMP experience as 4.16, with males (4.36) rating the experience higher than females (4.0). **Chart 6** provides average ratings of respondents for select LSAMP experiences on a scale of 1 to 5, with 5 being the highest. The lowest average rating was given for “*LSAMP meeting needs in a timely manner*” (3.08) and the highest for “*Support from LSAMP staff*” (4.14). All respondents reported that they would recommend the LSAMP Program to a peer.



Summary

- A majority of participants were African-American, very few were Native American/Alaskan Natives. In addition, the majority of participants were not first-generation-to-college, and a noticeable number were foreign born. Females outnumbered males.

- Overall, the rate of participation in research was low, particularly in the summer. However, satisfaction with research experiences was very high. Research opportunities were primarily identified by respondents themselves, or faculty members at their institution. Attending professional conferences was higher in the academic year than during the summer.
- Overall, LSAMP participants did not rate themselves low in terms of satisfaction with academic performance, although they were less satisfied with performance in science and math courses. Nearly all participants intend to pursue an advanced degree, primarily in science and engineering, although self-perceived readiness for advanced and graduate coursework was not high. Almost all participants entered college with an intended STEM major, and those who changed majors predominantly remained in a related STEM field. However, a majority of individuals who changed majors were racial URMs. Life science majors dominated, except among Hispanics where it was engineering, most of whom were female. Participants did not rate instruction at their respective institutions low, and rated their ability to complete a bachelor's degree high.
- Participants rated their LSAMP experience highly, with males rating their experience slightly higher than females. As in previous evaluations, Scholars indicated a strong willingness to recommend LSAMP to a peer.

Research Study (For more details, see the Research Study report.)

Largely, through no fault of the research PI and Co-PI, this component of the new award is off to a slow start. At the time of this report, no data analyses have been conducted. Based on interviews, data collection has been slowed by the UK IRB approval process of minor revisions to the original proposed data collection components. Year 1 and early Year 2 IRB approval for institutional partner representatives was delayed. The approval was time-sensitive because the institution representatives were tasked with emailing the survey links to the subjects (Scholars and non-Scholars). Nevertheless, researchers report some recent progress.

- A survey was administered at the beginning and end of the fall 2019 semester, and again at the beginning of the spring 2020 semester.
- Post-test data for the spring 2020 semester is in process.

Overall, there is a misalignment between the originally proposed study design and the reality of conducting research in multi-site venues where the research had to rely on third parties with multiple job obligations to assist in data collection. Further, calculating a response rate under the circumstance is challenging because actual population is fluid. Partners would need to authenticate the actual eligible subjects. Based on the external evaluators' experiences, the authentication process is time consuming, and the actual population is somewhat fluid. Another complicating factor is "survey fatigue." It turns out that Scholars were receiving survey links at least from both external evaluators and researchers. As mentioned above (See Scholar focus groups), Scholars were confused about originators and purposes of the surveys. The net result is that both sets of surveys received low response rates.

Recommendations

2019

Status

<p><i>A more enhanced STEM-focused graduate school and job recruitment fair should be implemented as part of the KY-WV LSAMP Symposium. Ideally, through both recruitment fairs and campus visits, relationships should be formed with graduate school programs participating in the NSF Bridges to the Doctorate initiative.</i></p>	<p>There was more recruitment representation at the 2020 symposium. There were six institutions represented including alliance institutions as well as Vanderbilt, the University of Tennessee, Knoxville, and the University of Cincinnati. From those six institutions, 11 departments/programs were represented. More information is shared with program participants regarding BD opportunities across the country. On November, 1, 2019, KY-WV LSAMP submitted a proposal to host a BD cohort at UK. That proposal was successful - we received the BD award on May 13, 2020. In November 2020, WVU will submit a proposal to host a cohort of BD Fellows. Program staff are also taking a more proactive role in encouraging alliance scholars to pursue BD and other fellowships across the country.</p> <p>Evaluators' response: Completed</p>
<p><i>To help ensure basic comprehension of the KY-WV LSAMP Alliance and the LSAMP goals, a uniform orientation format should be developed and posted on the Alliance website.</i></p>	<p>An orientation PowerPoint was created and shared during director campus visits. It will be updated and posted on the program website. In addition, we will create a Fall 2020 program orientation that will be delivered via a Zoom meeting. The meeting will be recorded and added to the program website as well.</p> <p>Evaluators' response: Completed</p>
<p><i>In order to aid in funding research experiences and social activities, faculty with eligible grants or proposals should be encouraged to apply for diversity supplements or REU's that support hosting scholars.</i></p>	<p>Though the lead institution and others have provided a number of letters of support for proposals such as REU's, each campus will be encouraged to do so more often.</p> <p>Evaluators' response: Completed</p>
<p><i>Improve the timeliness, appropriateness, and consistency of communication within and across sites. Concern was expressed that some of the posted opportunities for scholars are state- or institution-specific.</i></p>	<p>Opportunities sent via the scholar listserv are constantly changing. Though some are limited to certain institutions or certain majors/fields, we try to disseminate the information as widely as possible. Suggestions for improving communications are always appreciated.</p> <p>Evaluators' response: Is the mechanism for submitting suggestions posted on the Alliance webpage?</p>
<p><i>Improve advertising LSAMP on campuses: develop and implement standard operating procedures to introduce the program to Scholars. e.g., have scholars act as ambassadors for the program. Previous evaluations suggested Alliance t-shirt or sweat-</i></p>	<p>On many campuses, participants are asked to assist in recruitment efforts. Fall 2019, we distributed t-shirts to all program participants. We are hoping to have a participant t-shirt design contest in the next academic year. We have also been exploring other promotional ideas. These require, not only the idea, but also</p>

<p><i>shirt competitions. This would engage scholars and provide some campus visibility when scholars wear the shirts.</i></p>	<p>acquiring non-LSAMP funds for those purchases, since they are not allowable expenses on the grant.</p> <p>Evaluators' response: Completed</p>
<p><i>Develop and share strategies to secure more resources to build and enhance a sense of community among program participants. This includes providing scholars with dedicated office space to socialize with each other.</i></p>	<p>Conversations continue to happen on each campus to build partnerships and explore non-LSAMP funding sources. On some campuses, LSAMP has not only adequate, but wonderful participant as well as staff space. On other campuses, space (especially participant community space) is a challenge.</p> <p>Evaluators' response: Beyond conversations, is there a plan or strategy?</p>
<p><i>Develop strategic plans with faculty mentors to secure funds to support scholar travel to conferences.</i></p>	<p>Conversations continue to happen on each campus to build partnerships and explore non-LSAMP funding sources for participant travel as well as other opportunities.</p> <p>Evaluators' response: Beyond conversations, is there a plan or strategy?</p>
<p><i>Campus coordinators are encouraged to discuss holding the Symposium at institutions other than Marshall and the University of Kentucky.</i></p>	<p>The 2020 symposium was held at Kentucky State University. Though the event was a success, the 2021 symposium needs to be held at the University of Kentucky in order to develop a protocol/process for future host sites.</p> <p>Evaluators' response: Follow up item for the 2020 retreat</p>
<p><i>The Alliance office must secure documentation from the National Science Foundation/LSAMP office regarding which disciplines (i.e.. Majors) are designated STEM eligible.</i></p>	<p>We have a list of majors from NSF that was provided in 2015. Unfortunately, we have not, yet, received an updated list.</p> <p>Evaluators' response: In process</p>
<p><i>The Alliance must be more intentional in posting "promising practices and policies." Stakeholders continue to request information on effective recruiting and retention activities. Predominantly teaching institutions continue to call for more opportunities for their scholars to engage in research opportunities at research partner institutions.</i></p>	<p>Communication plays a large role in this. Sometimes, we communicate well. Other times, not as well. Recruitment and retention activities will be a topic of discussion during the 2020 Alliance Retreat. Because of current events (COVID-19), the Alliance Retreat will be held via Zoom instead of in person. In addition, we are hoping to have monthly Zoom visits during summer 2020 to discuss best practices.</p> <p>Evaluators' response: In process</p>

2020

- The Director should coordinate the administering of Evaluation and Research surveys in order to avoid confusion and survey fatigue among Scholars. Not doing so will result in low-response rates for both surveys, thereby negating the use of quantitative analyses. However, this will require dedicated time from each campus coordinator or program staff.
- At the final activity, provide Scholars with short assessment form to leave their suggestions for improving the event. The Director and the campus coordinators should decide the collection procedure.
- Continue to engage campus coordinators in the agenda planning and scheduling the Symposium. Ideally, this could be done at the Retreat whether remotely or in-person.
- Revise the original research plan design, (especially data collection) including the timetable, to be more appropriate for realities of the daily operations of the various partners. Given the diversity of institutional partners, research may wish to consider a random or stratified sampling approach. Otherwise, results may be skewed towards larger institutions.
- Scholars majoring in pre-med/pre-health complained that much of the focus at the Symposium and some of the online post of external research opportunities fail to address their career interest. In the initial recruitment of Scholars, Program coordinators or staff should inform potential recruits that NSF's focus is on science, technology, engineering, and mathematics and not health/medical professionals. NIH's focus is health and medical sciences and related careers. **(Note that the survey findings reveal a substantial percentage of Scholars plan to pursue MD or MD/PhD degrees.)**
- The retreat should engage campus coordinators in an intentional discussion regarding operation in the text of COVID-19 policies and practices.
- Continue to share promising practices for the evaluators' site visits. *This year's in-person and virtual site visits were exceptionally well planned and executed. All interviewees were on time and well prepared.*
- In view of the increasing student financial aid challenges, campus financial aid officials, campus coordinators, and the Director should schedule a session on the topic at the Symposium, or a session at each institution, or a virtual session at the Alliance Office.
- Continue to authenticate the accuracy of the LSAMP Scholars' email address. The Alliance will need the cooperation of the institutional partners to be successful. This is a critical matter because an extremely low response rate can render the data useless for analytical purposes.

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APPENDIX D

BRIDGE TO THE DOCTORATE
NEWS RELEASE

NSF Awards KY-WV LSAMP \$1 Million to Support Underrepresented Students Pursuing Graduate STEM Degrees

By [Jenny Wells-Hosley](#) Monday



KY-WV LSAMP students at a research symposium in March 2018. The program has received \$1 million in new funding from the NSF to support graduate students pursuing STEM degrees at UK. Photo by D'Avon Adkins | D.I.G. Photography.

LEXINGTON, Ky. (June 1, 2020) — The [Kentucky-West Virginia Louis Stokes Alliance for Minority Participation \(KY-WV LSAMP\)](#), spearheaded by the University of Kentucky, has been awarded over \$1 million from the National Science Foundation (NSF) to support UK graduate students pursuing degrees in the fields of science, technology, engineering and mathematics (STEM).

The grant will fund a Bridge to the Doctorate (BD) initiative for KY-WV LSAMP, a consortium of 10 colleges and universities working together to broaden participation and increase the quality and quantity of underrepresented students in STEM. The new program will support 12 BD fellows from underrepresented populations who are pursuing graduate degrees in STEM disciplines at UK.

“Bridge to the Doctorate fellowships are prestigious awards granted to select institutions,” said Fara Williams, director of KY-WV LSAMP. “This is a great opportunity for KY-WV LSAMP and the University of Kentucky to significantly impact the recruitment and retention of students from underrepresented populations in STEM graduate programs.”

Each fellow will receive a \$32,000 per year stipend as well as support for cost of education for two years through the grant. Fellows will receive coaching, academic and community support, professional development, and access to opportunities for research, writing and presentation.

“I am excited about what the Bridge to the Doctorate program means to our campus community, and most importantly, the lives of underrepresented minority students in STEM disciplines, especially those who aspire for a terminal degree,” said Sonja Feist-Price, UK vice president for institutional diversity and co-principal investigator on the grant. “Heartfelt thanks and appreciation are extended to Fara, who played a significant role in spearheading the writing of the proposal. She remains thoughtful about the ways in which students in STEM disciplines are supported in maximizing their potential, both on and off campus.”

Since receiving renewed funding in 2018, KY-WV LSAMP has grown from 280 to 378 student participants, with over 50% of its graduating students continuing their education in graduate programs.

“LSAMP recognizes the University of Kentucky as a regional leader in providing opportunities for underrepresented students in STEM fields,” said UK Provost David Blackwell, who serves as principal investigator for the grant. “The Bridge to the Doctorate program underscores our commitment to building a stronger workforce and creating a brighter future for our state and region.”

Additional co-PIs on the new grant include Brian Jackson, dean of UK Graduate School; Johné Parker, associate professor of mechanical engineering; and Brett Spear, professor of microbiology, immunology and molecular genetics.

Students interested in applying for a BD fellowship may do so starting Monday, June 8. For information on requirements and the application process, contact Fara Williams at 859-218-6326 or fara.williams@uky.edu.

KY-WV LSAMP is a unit based in [UK's Office for Institutional Diversity](#). In addition to UK, the alliance includes Bluegrass Community and Technical College, Centre College, Jefferson Community and Technical College, Kentucky State University, Marshall University, the University of Louisville, West Virginia State University, West Virginia University and Western Kentucky University.

Named in honor of the former Ohio congressman, the Louis Stokes Alliances for Minority Participation (LSAMP) program is an alliance-based program designed to assist universities and colleges in diversifying the nation's STEM workforce by increasing the number of STEM baccalaureate and graduate degrees awarded to populations historically underrepresented. Overall, the NSF program provides funding to alliances that implement comprehensive, evidence-based, innovative and sustained strategies that ultimately result in the graduation of well-prepared, highly qualified students from underrepresented minority groups who pursue graduate studies or careers in STEM.

The University of Kentucky is increasingly the first choice for students, faculty and staff to pursue their passions and their professional goals. In the last two years, Forbes has named UK among the best employers for diversity, and INSIGHT into Diversity recognized us as a Diversity Champion three years running. UK is ranked among the top 30 campuses in the nation for LGBTQ inclusion and safety. UK has been judged a "Great College to Work for" two years in a row, and UK is among only 22 universities in the country on Forbes' list of "America's Best Employers." We are ranked among the top 10 percent of public institutions for research expenditures — a tangible symbol of our breadth and depth as a university focused on discovery that changes lives and communities. And our patients know and appreciate the fact that UK HealthCare has been named the state's top hospital for four straight years. Accolades and honors are great. But they are more important for what they represent: the idea that creating a community of belonging and commitment to excellence is how we honor our mission to be not simply the University of Kentucky, but the University **for** Kentucky.*

APPENDIX E
FACULTY AND STAFF
HIGHLIGHTS

*Celebrate
with us*



IN HONOR OF

Charlene Walker's

RETIREMENT

Friday, June 28, 2019

3:30pm to 6:00pm

BCTC Cooper Campus

Academic Technical Building

The Impact of LSAMP: Meeting a Nation's Call for Diversity in STEM Careers



Fara Williams, KY-WV LSAMP
Ariana Arciero-Pino, UT LSAMP
Brenda Morales, OK-LSAMP
Dr. Tabitha Hardy, Former Fellow
Michelle Quirke, IN LSAMP

Tracking LSAMP Participant Involvement: Strategies for Success

Free Webinar



Fara Williams
Director
KY-WV LSAMP

June 24, 2019/4 PM EST
Join from PC, Mac, Linux, iOS or Android:
<https://lu.zoom.us/j/431311076>



Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation. An LSAMP is supported by NSF Award Number: HRD-0328406, 2010-2011.

KY-WV LSAMP ALLIANCE RETREAT

Four Points Sheraton, Lexington, KY, June 14-15, 2019



Pictured Above L-R: Fara Williams, UK; Mark Pittman, UK; Maurice Cooley, Marshall; V. Faye Jones, UofL; Johné Parker, UK; Charlene Walker, BCTC; Willie Pearson, Evaluator; Raúl Torres, UK; Girmay Berhie, Marshall; Kazi Javed, KSU; Tierra Freeman-Taylor, KSU; Charles McGruder, WKU. Attended, but not pictured: President Capilouto, UK; Victoria Cloud, BCTC; Kiana Fields, UofL.



APPENDIX F
CONFERENCES AND
SYMPOSIA

GEM GRAD LAB

UNIVERSITY OF TENNESSEE, KNOXVILLE
SEPTEMBER 27-28, 2019



Attending from KY-WV LSAMP: Corey Baker, Ph.D., UK Assistant Professor; Charles "Carlos" Beasley, UK; Jaeanna Gates, UK; Caitlin Mickles, WVU; Asare Nkansah, UK; Steven Roberts, UK; Raúl Torres, UK Coordinator; Kayla Titalii-Torres, UK Graduate Student; Fara Williams, Project Director





Women of Color STEM Conference

Detroit Marriott at the Renaissance Center

October 3-5, 2019



APPENDIX G
INDIVIDUAL
SCHOLAR and ALUMNI
HIGHLIGHTS

Student receives SMART Scholarship

MAY 11, 2020

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Jacqueline Brown, a Marshall University senior, has received a National Defense Education Program SMART (Science, Mathematics and Research for Transformation) Scholarship. As part of the program, Brown will participate in a summer internship at a Department of Defense facility and receive civilian job placement after graduation with the Department of Defense, in addition to a stipend and scholarship.

A computer and information security major, Brown is active in research, community service and leadership. She is a computer science leadership program leader, and also works as a NASA West Virginia Space Grant Consortium undergraduate student fellowship researcher, where she researches Collusive Interest Flood attacks. In the past, she has participated in the Summer Undergraduate Research Experience, and is a member of the Society of Black Scholars.

Brown says she is very excited about the opportunities the SMART Program will provide.

"I am very grateful to have been selected for the SMART Scholarship," she explains. "I am thrilled to be able to help our nation as a part of the Department of Defense."

Dr. Wael Zatar, dean of the College of Engineering and Computer Sciences, says Brown is the kind of hard worker that deserves an opportunity like this one.

"I have had the absolute pleasure to have several wonderful interactions with Jack over the past couple of years and she continues to impress me with her talent, devotion, love of computer science and cybersecurity, and persistence to reach to the top," Zatar said. "She has conducted research in the areas of cybersecurity, wireless networks & mobile computing, and named data networking under the supervision of Dr. Cong Pu since Fall 2018. She published significant research results at the 2020 IEEE International Conference on High Performance Switching and Routing (HPSR) and the 2019 IEEE International Conference on Cyber Physical and Social Computing (CPSCom). Her motivation and persistence to climb to the top made it possible to land the very prestigious SMART Scholarship."

Zatar said he's proud of what Brown has been able to accomplish and looks forward to what the future holds for her.

"I am so proud of Jack's unique achievement, look forward to hearing lots of positive updates and trust she will be able to make all her dreams come true," Zatar said.

The SMART Scholarship is awarded to students in science, technology, engineering and mathematics disciplines who demonstrate an interest in working for the federal government. Awardees must be eligible to receive and maintain a security clearance and must be U.S. citizens. The program has an average overall award rate of 14% and accepted around 350 scholars this year.

For more information on the SMART Scholarship, contact smart@lmi.org by e-mail or Mallory Carpenter with Marshall University's Office of National Scholarships by e-mail at Mallory.carpenter@marshall.edu or by phone at 304-696-2475.



CONGRATULATIONS!

Congratulations to the Top 10 Student Finalists and the **Top 3 Overall Winners** of the **2nd annual 5-Minute Fast Track Research Competition!**

The students competed in two preliminary rounds and were selected as a Top 10 finalists to advance to the final round of competition. The Final Championship round was held on Wednesday, October 23 in the WT Young Library Auditorium. The students had five minutes and one static slide to present their research to an audience and panel of judges that included Provost David Blackwell, Dr. Marilyn Campbell, and Carol Street. The students were competing for cash prizes (\$750 – 1st place; \$500 – 2nd place; \$250 – 3rd place).

The Top 3 Overall Winners include:

- **1st place: FRANCES SALISBURY** – Biology major, junior | Research Area: Sleep and Alzheimer’s Disease | Faculty Mentor: Bruce O’Hara (Biology)
- **2nd place: MALIK APPLETON** – Pre-Pharmacy major, senior | Research Area: Neuropharmacology | Faculty Mentor: Keith Pennypacker (Center for Advanced and Translational Stroke Science)
- **3rd place: EMILY KEATON** – Sociology, Philosophy, English major, senior | Research Area: Sociology, Appalachian Studies | Faculty Mentor: Edward Morris (Sociology)

The [5-Minute Fast Track Research Competition](#) is an academic competition that cultivates undergraduate students’ presentation and research communication skills, and challenges them to describe their research within five minutes using a single slide. The 2019 5-Minute Fast Track Research Competition was sponsored by [The Chellgren Center for Undergraduate Excellence](#) and the [UK Office of Undergraduate Research](#).

At the University of Kentucky, research is a great opportunity provided to students and undergraduate research is central to creating a well-rounded student experience. The Office of Undergraduate Research is dedicated to providing coordination, leadership, and support for research endeavors at the undergraduate level.

Self-Adjusting Share-Based Countermeasure to Interest Flooding Attack in Named Data Networking

Publisher: IEEE

3 Author(s) [Cong Pu](#) ; [Nathaniel Payne](#) ; [Jacqueline Brown](#)

Abstract:

Due to the rapid growth of Internet traffic, increasing mobility, and stronger security requirements, today's Internet shows signs of aging. To keep pace with changes and move the Internet into the future, Named Data Networking (NDN), a future Internet architecture, was proposed and has been demonstrated as a viable architecture for content distribution and widely recognized as a promising architecture for future Internet. However, NDN is not originally designed to consider the security requirement for all potential attacks, thus, NDN is vulnerable to a well-known Distributed Denial-of-Service (DDoS) attack that primarily targets service availability by flooding the network and obstructing the service received by legitimate users. In this paper, we propose a self-adjusting share-based countermeasure, also referred to as SSC, against Interest flooding attack in NDN, where the attacker issues an excessive number of non-satisfiable Interest packets to drop legitimate Interest packets by overwhelming Pending Interest Table in NDN routers. In the SSC, each router maintains an Interest unsatisfaction ratio and dynamically adjusts the share of forwarded Interest packets for each incoming interface accordingly. In addition, the Interest packets that pass the assigned share of forwarded Interest packets are used as scouts to investigate unknown paths to complement routing information. We conduct extensive simulation experiments for performance evaluation and comparison with the existing constant share based approach. The simulation results show that the proposed countermeasure can not only improve the Pending Interest Table utilization ratio of legitimate Interest packets, but also reduce the number of accepted malicious Interest packets, indicating a viable approach against Interest flooding attack in NDN.

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Determination of the Free Energies of Mixing of Organic Solutions through a Combined Molecular Dynamics and Bayesian Statistics Approach

Shi Li; Balaji Sessa Sarath Pokuri; Sean M. Ryno; Asare Nkansah; Camron De’Vine; Baskar Ganapathysubramanian*; and Chad Risko*

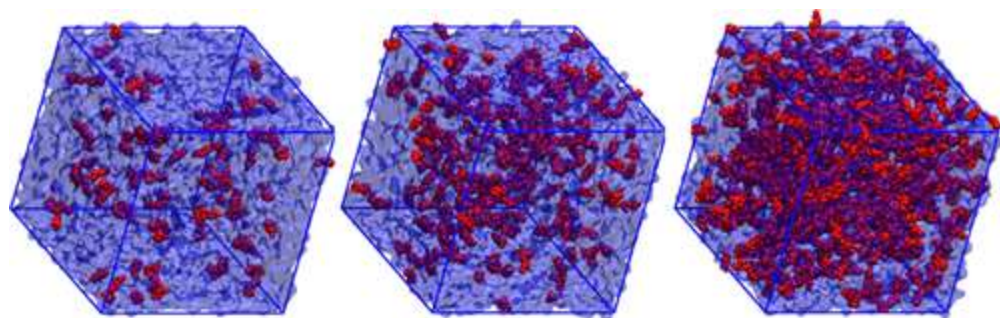
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Abstract



As new generations of thin-film semiconductors are moving toward solution-based processing, the development of printing formulations will require information pertaining to the free energies of mixing of complex mixtures. From the standpoint of in silico material design, this move necessitates the development of methods that can accurately and quickly evaluate these formulations in order to maximize processing speed and reproducibility. Here, we make use of molecular dynamics (MD) simulations, in combination with the two-phase thermodynamic (2PT) model, to explore the free energy of mixing surfaces for a series of halogenated solvents and high-boiling point solvent additives used in the development of thin-film organic semiconductors. Although the combined methods generally show good agreement with available experimental data, the computational cost to traverse the free-energy landscape is considerable. Hence, we demonstrate how a Bayesian optimization scheme, coupled with the MD and 2PT approaches, can drastically reduce the number of simulations required, in turn shrinking both the computational cost and time.

4 June 2019 Material response of metasurface integrated uncooled silicon germanium oxide $\text{Si}_x\text{Ge}_y\text{O}_{1-x-y}$ infrared microbolometers

[Akshay Kumar Reddy Koppula](#); [Amjed Abdullah](#); [Tao Liu](#); [Omar Alkorjia](#); [Chen Zhu](#); [Cameron Warder](#); [Shayne Wadle](#); [Phyllip Deloach](#); **[Savannah Lewis](#)**; [Edward Kinzel](#); [Mahmoud Almasri](#)


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Proceedings Volume 11002, Infrared Technology and Applications XLV; 110021L (2019)

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Event: [SPIE Defense + Commercial Sensing](#), 2019, Baltimore, Maryland, United States

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Abstract

This paper presents a study of metasurface integrated microbolometers. The semiconductor absorber is sandwiched between a metal Frequency-Selective Surface (FSS) and ground plane. When the semiconductor absorber is electrically isolated from the ground plane by a thin dielectric it can be used to measure the temperature of the pixel. The integration with the FSS removes the need for a Fabry-Perot cavity. The FSS allows control the attributes of radiation absorbed by the microbolometer on a pixel-by-pixel basis which provides the potential for spectral or polarimetric imaging. The FSS also affects the electrical performance of the semiconductor absorber and the thermal performance of the microbolometer. In addition, the complex permittivity of the semiconductor affects the optimal design of the FSS. The Si/Ge/O system is selected because it allows the properties of the absorber to be engineered (e.g., less oxygen gives lower absorptance and higher resistivity). This paper explores the absorber/FSS parameter space with an emphasis on the electrical and noise properties of the integrated system. Models are developed to explain results. Preliminary results show that the addition of the FSS improves TCR of the microbolometer by 10% while dramatically lowering its resistivity (factor of 5 \times). The resistivity reduction leads to a dramatic reduction of the noise power spectral density with the addition of FSS improving the measured 1/f noise by two orders of magnitude over an identical sample without the FSS. In addition, this paper will present the microbolometer figures of merits including voltage responsivity, detectivity, and thermal response time.

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