UnSTEMming the flow

Drs Camille McKayle and Robert Stolz are a collaborative research team dedicated to increasing retention and persistence in the study of STEM subjects. Below, they outline their motivations, achievements and the projects they are involved with.

What initially attracted you to explore STEM outreach and research programmes relating to the retention and persistence of students?

The University of the Virgin Islands (UVI) is a Historically Black College/University (HBCU), serving a population that is primarily from the US Virgin Islands. Many students who choose UVI arrive underprepared for college-level work. However, this does not mean they are undermotivated and, as faculty members at UVI, we want to have a positive impact on the students and believe they can achieve the highest level of education in the sciences.

Prior to our arrival, UVI had successful programmes aimed at increasing the number of graduates going on to gain a PhD in the Biomedical Sciences. These programmes – funded by the National Institutes of Health (NIH) – focused primarily on providing undergraduate students with research experiences while they were undergraduates.

In 1999, the National Science Foundation (NSF) started the Historically Black Colleges and Universities Undergraduate Program (HBCU-UP). With funding from the Foundation, HBCUs were able to design and implement strategies that would strengthen the preparation for graduate study in the sciences and the STEM workforce. These projects were to be comprehensive in nature.

How have you developed the methods of your approach and why?

The success of the NIH-funded programmes at UVI encouraged us to fashion a similar approach for the first NSF HBCU-UP grant. However, the target audience was broader, to include all STEM majors at UVI. Over the years, we have researched, expanded and refined our approach to student success in STEM. We wanted to be more intrusive in our approach and impact more students starting early in their college careers. Hence, we researched various hands-on, engaging approaches and, from that launch pad, designed interventions for pre-freshman, pre-sophomore and upper-class students. We also designed approaches that would encourage students in the lower, middle and upper achievement groups of students based on their grade point average.

You intend to increase retention rate for STEM majors from 67 to 75 per cent. Can you elaborate on this?

Increasing retention, persistence and graduate rates is a university-wide goal. This project focuses on STEM students and hopes that the approaches and results can be generalised to the broader UVI student population. However, the issue of retention in STEM transcends UVI, and it is especially important as we, as a nation, seek to increase representation across various groups in STEM.

This project takes a comprehensive approach to retention and persistence. We offer academic preparation early on (pre-freshman and freshman year) focused on mathematics, as there are many studies that indicate success in mathematics is a determining factor in STEM student success. However, we also acknowledge the importance of creating an advisory approach in the College of Science and Mathematics that focuses on freshman and sophomore students. Faculty were designated ‘super advisors’ and given release time to serve a far greater number of freshman and sophomore students with intrusive advising that depends on early alerts provided by faculty.

What actions are you taking to monitor under-preparedness in first-year students?

As part of this project, a section of the University’s Freshman Development Seminar was created for STEM students. These sections are taught by STEM faculty and provide a way to keep close ties with freshman students. Additionally, the super advisors track student progress, working with faculty who are asked to do early alerts to the Center for Student Success so that students can be closely monitored.

Finally, can you tell us about some of your other major activities to address STEM retention?

There is other funding within the College of Science and Mathematics that addresses recruitment and retention of students in STEM. The College’s NIH-funded programmes aim to increase the number of underrepresented groups going on to obtain PhD in the Biomedical Sciences. We collaborate with these programmes to host visiting scientists and speakers who share their research and stories about their academic journey with students.

Retention is a UVI-wide focus, thus, some of the activities that were enabled through the NSF HBCU-UP grant project have served as proof-of-concept for adoption across the University. Hence, there is a broader summer bridge programme that is similar to the Mathematics Behind the Science (MBS) programme, primarily aimed at having students placed into college-level courses at the beginning of their freshman year.
Shaping STEM’s future today

The University of the Virgin Islands has established a wide variety of co-curricular interventions that specifically address improving the retention, persistence and career awareness of STEM students. By providing a strong foundation, the needs of both incoming students and the STEM curriculum are met.

UNDERSTANDING THE SUBJECTS of science, technology, engineering and mathematics (STEM) is more important now than ever before. The 21st Century has given rise to a technological age that influences human lives on an unprecedented scale – consider, for example, the impact that computers and, more recently, smartphones have had on everyday existence.

If STEM subjects can be said to shape the present, then the bearing they will have on our future is likely to increase exponentially year-on-year. Indeed, present challenges that are predicted to become worse over time – such as climate change, global hunger and disappearing habitats – can potentially be solved by employing the expertise of those involved in STEM subjects.

It is therefore crucially important that the future of the world – namely, children and young adults – are well-versed in some (or all) STEM subjects, so that positions such as biomedical engineers, surgeons, chemists, computer scientists and biophysicists, to name a few, are readily filled. A world that becomes increasingly reliant on STEM subjects must continue to produce experts in those fields to cope with the demands of the future.

IMPLEMENTING INTERVENTIONS

In an attempt to usher in the next generation of STEM students, the University of the Virgin Islands [UVI] has established the Emerging Caribbean Scientists (ECS) initiative. ECS, an umbrella term, incorporates a wide range of research training programmes and activities at UVI. The programme was created to encourage and facilitate synergies between various different funding opportunities available to those studying in UVI’s College of Science and Mathematics. Through mentoring, scholarships and summer programmes, the team hopes to increase research training and promote excellence for STEM – and it has also expanded the scope to include both psychology and nursing.

Led by Principal Investigator Dr Camille McKayle, in collaboration with Co-Principal Investigator and Mathematician Dr Robert Stolz, the major goal of the programme is to meet the educational needs of incoming STEM students at UVI and, in doing so, implement a comprehensive strategy to increasing the rates of retention, persistence and graduate across the university.

DOING THE MATH

One of the main co-curricular interventions that has been implemented is the Mathematics Behind the Science (MBS) summer bridge programme. The aim of this particular strand of the ECS initiative is to accelerate the progress of students and create a STEM community. The six-week programme aims to prepare students for the next level of mathematics they will experience at the beginning of their college career. If, for example, a student has little or no
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