97% of [RISE] students graduated with their original choice of degree and over 85% now work in STEM disciplines

Dominique Munson (Biology 2017) on right, presenting her research at Johns Hopkins. Dominique is conducting post-bachelor work at Virginia Tech.

Helping students RISE to the challenge

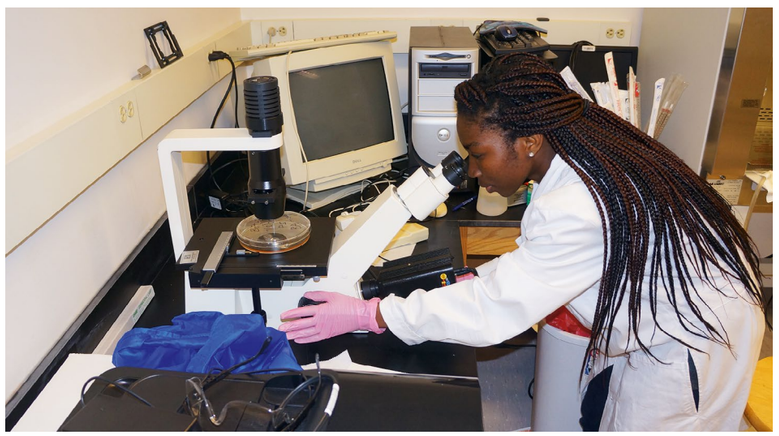
Dr Christine Hohmann of Morgan State University, Maryland, USA, provides access for students from a diverse range of backgrounds to the hugely successful RISE program. Throughout the program students have the opportunity to develop their research skills, work in labs on and off campus and increase their interdisciplinary knowledge. The National Institutes of Health-funded grant achieves above average rates of course completion, employment in a relevant field and PhD program enrolment.

Encouraging undergraduate students to commit to continuing their career in science after graduating can be a daunting challenge for any university. Morgan State University (MSU) in Maryland, USA, faces the additional hurdle that many of their students come from a variety of backgrounds that include limited exposure to advanced degrees in STEM. Christine Hohmann, Professor of Biology and Dr Angela Winstead, Professor of Chemistry, at the School of Computer, Mathematical, and Natural Sciences within MSU, are determined to help their students unlock their full potential. The RISE program they coordinate, funded by the National Institutes of Health, allows students to access valuable mentoring and training opportunities and encourages them to think of their futures as scientists.

RISE PROGRAM

The aim of the RISE program is to present "talented and highly motivated undergraduate STEM [Science, Technology, Engineering and Maths] and Social Behavioural Sciences students" with opportunities they would not otherwise have access to, with the intention of improving their lifelong success in science careers. One of the opportunities students can take advantage of as part of the RISE cohort is to engage in faculty mentored research. Students have the chance to work in a range of labs and research teams, both on and off the MSU campus, and work across multiple disciplines. Students also secure the opportunity to present their work at national conferences.

These life changing experiences stem from a solid 'ground-up' approach. Students who enter the program at various stages in their academic career attend summer workshops in critical thinking and science process skills such as how to read a science paper, write a conference abstract, and present a conference poster. During the months and years that follow, students receive increasingly more sophisticated formal and informal training in these skills, via courses such as "Critical Analysis of the Scientific Literature and Senior Thesis Seminar", by presenting their research at regional and national science conferences and via highly interactive workshops and retreats that help them shape their career trajectories. While undertaking core training modules and capstone courses, students experience an interdisciplinary approach to research, build communication skills and develop and practice codes of professional conduct. Upon completion of the program, students will have worked with members of many other degree programs ranging from engineering to behavioural science and other STEM disciplines. By introducing students to the benefits of collaboration and cross-disciplinary knowledge from the very beginning, Dr Hohmann is equipping students to not only be excellent individual academics, but also important contributors to research teams. Dr Hohmann predicts that the skills gained through participation in the RISE program will prepare students for further education and employment in health-related fields.



Blessing Akobundo, Biology major, graduated in May 2017 and is now attending a PhD program in Biomedical Sciences at Brown University. Blessing wants to be a cancer researcher.

The science students undertaking the RISE program are largely first-generation college students and all come from underrepresented groups in STEM. In the USA, students from low socioeconomic backgrounds who cannot afford university tuition may be entitled to receive help with funding their studies. This financial help, known as a Pell Grant, is provided by the US Department of Education and many MSU students are Pell Grant recipients. Dr Hohmann sees none of these facts as barriers to success.

GREAT ACHIEVEMENTS

Whilst the aims of this project are undeniably admirable, the achievements of the young scientists involved are even more outstanding. The participants of the RISE program consistently trounce national averages. Since the first cycle of RISE in 1999, there have been over 100 graduates. 97% of these students graduated with their original choice of degree and over 85% now work in STEM disciplines. The

current cycle of RISE has seen over 40% of participants entering PhD programs and over 60% attending graduate school in general. This figure is particularly impressive when it is considered that the national average percentage of students entering graduate school after completing their undergraduate studies in the USA is 21.7% (National Center for Education Statistics, US Dept. Education 2012).

This data does not account for the even lower proportion of students from minority backgrounds likely to pursue further education. MSU already contributes to the growing number of science and engineering doctorates obtained within the USA, as well as providing well-rounded, highly trained individuals with excellent skills and life experiences to the workplace.

INDUSTRY-WIDE IMPACT

For the students involved in this program the benefits are outstanding. However, there are greater benefits to the field of science such as the addition of more talented young professionals. Over 90% of students at MSU and in the RISE program are African American – a demographic which remains underrepresented within biomedical research, and many other scientific fields. The enablement of more diversity within the workforce is known to enhance creativity and productivity and will present future generations with role models they can more closely relate to, and aspire to emulate. The variety of academic, socioeconomic and ethnic backgrounds that MSU students contribute to the workforce will lead to valuable insights and collaborations between scientists. The collaboration focus and interdisciplinary training received during the RISE program equips graduates with communication and teamwork skills to the benefit of a biomedical research community which relies increasingly on team efforts.

Within social science literature there is an understanding that scientists of an ethnic minority in the industry may feel a lack of community or belonging. Drs Hohmann and Winstead identified this problem in the initial stages of their application for funding and always sought to encourage "mental preparedness and resilience" within RISE program participants. The skills and experience gained through the program are important tools to help students feel confident in the workplace. However, the community MSU graduates form amongst themselves is also an important achievement in overcoming feelings of exclusion. Dr Hohmann hopes that MSU graduates will retain this closeness and form a supportive network of young scientists to motivate and inspire each other.

The RISE program, when combined with dedicated leadership and talented students, seems certain to lead MSU students to future successes. Drs Hohmann and Winstead's long term goal to "contribute researchers that possess the ability to address some of the critical health disparities in our nation" is well within reach.

LaKeisha Lewter (BS Biology 2013, on right) and Grace Nyambura (BS Chemistry 2013, left) reunite upon return to the Annual Graduate Careers Workshop. Keisha is completing her PhD in Neuroscience at SUNY Buffalo and Grace is shopping around for doctoral programs in International Health after recently completing her MPH at Morgan. At the workshop, returning students serve as role models for students currently in the RISE program.

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Q&A

Q&A with Dr Hohmann

What was your inspiration for starting this program?
We both have struggled as women and in Dr Winstead's case as a minority female, to reach our career goals in science. I have wanted to help level the playing field for our students to reach their dreams.

Do students ever surprise you, or themselves, with their achievements?
Yes, mostly, they surprise themselves. We hear that a lot:" I never thought I could do this".

Is there scope for these ideas to be used at different universities to help more students achieve their full potential?
NIH-funded RISE programs exist at minority serving universities across the US and the program has been quite successful in other settings as well. I believe, a successful program is one that is well-matched to its students' needs. We have worked for some years with an excellent program Evaluator, here at MSU, Dr Stella Hargett, who chairs the Sociology department at MSU. She has greatly helped us to understand what aspects of training do and do not work for our students. A lot of our practices have a foundation in social sciences research.

Olumayokun Odukale
BS Civil Engineering, MSU 2014; MS Environmental Engineering 2016 at Carnegie Mellon University. Currently conducting an Environmental Health internship in Nigeria, and plans to enter a PhD training in Environmental Health/ Public Policy upon his return to the US

"RISE helped me understand the importance of scientific reasoning in empowering others to understand and resolve problems within their community. This ties into my career interest of empowering developing countries to address issues of climate change while pursuing sustainable development goals. An increase in scientific literacy in any society will lead to more efficient government policy and actions as the people and government interact with one another."

"My most valuable experience out of RISE was the ability to mentor others. Through the mentorship experience, I was able to learn about a variety of topics as I immersed myself into various groups' research topics."

Angelique Williams
BA Psychology, MSU 2016
Currently a PhD student, Program in Applied Developmental Psychology, George Mason University, VA

"The RISE program has supported my career development in a number of ways. It has provided me with the research tools, and professional skills to thrive in a high-pace academic research environment. It has also prepared me with the confidence and presentation skills to successfully navigate and network at conferences, symposia, and other research events."

"The most valuable experience that I got out of RISE was the opportunity to see researchers that looked like me. It was extremely inspirational to see scientists of colour, across the disciplinary spectrum, successful in the field of sciences."

"It was very valuable to learn information (even if only preliminary) on a number of topics, and has broadened my brainstorming process. As a result of training I've received in RISE I now consider research questions from more angles than I would have if only exposed to the field of Psychology."

LaKeisha Lewter
BS Biology 2013, MSU
PhD Candidate in Neuroscience, University of Buffalo, NY

"The RISE program provided many workshops that supported my career development. In the summers, the RISE program held 'boot camps'. From these boot camps I was able to learn how to read/comprehend research articles, how to conduct literature searches, how to effectively present my research findings (via writing, poster, and oral presentations). Other helpful workshops included discussions about research ethics, mock graduate school interviews, and how to successfully apply and survive graduate school."

"The most valuable experience I received from the RISE program was the mentorship/support from RISE directors and administrators. They provided so much knowledge and encouragement, which ultimately inspired me to continue to pursue my PhD."

Detail

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The National Institutes for General Medical Science (NIGMS)

COLLABORATOR
Dr Stella Hargett, program Evaluator, MSU

BIO
Dr Christine Hohmann earnt her BS at Cologne, Germany and her PhD in Neuroscience from Brown University, USA. She completed her post-doctoral training and early faculty career at Johns Hopkins University. Her 25-year career as a researcher, teacher and mentor at Morgan State University has prepared her for her role as NIH RISE Program Director, which she has undertaken since 2003. Dr Hohmann is most happy when mentoring and training young research students.

Dr Angela Winstead, Professor of Chemistry, is a Science, Technology, Engineering and Mathematics educator and researcher who uses her education and professional experience to encourage the development of student growth and to inspire and empower young, African-American scholars to reach their highest potential. She earnt her PhD in Chemistry from University of North Carolina at Chapel Hill and post-doctoral training in Organic Chemistry at The Ohio State University. She is the Co-PI of the RISE program.

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