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Making Math Meaningful at Wilberforce University

BY CYNTHIA MWENJA, PhD

Ramadan El Sharif, assistant professor of Mathematics at Wilberforce University, brings his passion for teaching mathematics to students at all levels and in all degree fields. He clearly communicates the importance of math literacy for a diverse array of professional roles, and he understands that part of his responsibility as an instructor is to make those connections for students while also finding innovative ways to support them in learning the skills.

He has singlehandedly redeveloped Wilberforce's math curriculum in just two years, including implementing improvements in online teaching approaches, and he now seeks to develop added campus lab capacity through targeted grant writing.

According to its website, Wilberforce University—named for abolitionist William Wilberforce and established in 1856—“is the nation's oldest private, historically Black University owned and operated by African Americans.” Beyond a brief closure during the Civil War, the university has been in continual operation since its establishment. El Sharif came to this storied institution in the fall of 2023 with a wealth of experience teaching a wide array of math classes. Prior to earning scholarship support for coming to the United States in order to collaborate with his mentor at Kent State University, El Sharif had already taught math classes equivalent to all of Wilberforce's established curricula at home in his native Libya. After gaining experience as a teaching assistant at Kent State, he began to serve as instructor of record at other

institutions of higher learning in 2015. By the time he finished his PhD program, he was teaching a full load of classes in addition to finishing his dissertation.

Developing a Dynamic Curriculum

El Sharif says that the university and wider community need and deserve a strong Mathematics department because all students will use math in some capacity in their lives, ranging from applied math to statistics. He points to just a few examples, such as K-12 educators, who are often students' primary math instructors, as well as medical professionals, who need to understand the math behind prescription dosages. As El Sharif points out, “math is everywhere.”

El Sharif also notes that a Mathematics major or minor pairs well with a variety of degrees, such as Computer Science, Kinesiology, and—of course—Engineering. He says with a smile that math people like him simply want to major in math, but some Engineering students have an equal interest in the study of Mathematics, as well; he has

noticed that some Engineering students “can't stop taking math classes.” El Sharif wants to ensure that these Wilberforce students can earn a second major or a minor in this field they enjoy delving into.

Since all students will need math, El Sharif states, they should have opportunities during their general education courses to tie math to their areas of study. For example, Psychology majors need to know how to work with quantitative survey data, as well as how to work with Excel. He envisions giving these students data sets to play with, “like a game.” He affirms that when students start math study early and have the chance to play around with the concepts and skills, they learn more easily. Gerard McShepard, associate provost for Academic Affairs, says that El Sharif “has been dedicated to our students by teaching mathematics and continues to leave an indelible mark on generations of Bulldogs. He continues to show a dedication, passion, and care for his students. He is also a professor who inspires students beyond the classroom as well.”

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Pursuing Grant Funding

In addition to being a skilled and experienced math educator, El Sharif is also an enthusiastic grant writer. Lynda Brown-Wright, provost and vice president for Academic Affairs, says that he is always trying to find resources to support Wilberforce students; he consistently both develops grants and attends grant-writing workshops toward that end. Recently, El Sharif organized a workshop at Wilberforce with the Minority Serving-Cyberinfrastructure Consortium to train university stakeholders in seeking monies for research infrastructure. Other schools came to campus to participate in the day-long event. Wilberforce leaders hope to use the information from the workshop to develop campus capacities by adding lab facilities. One of El Sharif's pending grants seeks funding for math tutoring and data analytics labs, and Brown-Wright envisions an artificial intelligence lab, as well. Other grants pending for El Sharif seek various kinds of support

for students pursuing careers in science, technology, engineering, and mathematics (STEM) fields. As Brown-Wright notes, such grants can have large impacts at small institutions of higher learning, and she appreciates the efforts that El Sharif makes in this arena.

Tackling Responsibilities

While Mathematics courses are currently housed in the Department of Engineering, El Sharif reports that a university goal is to develop and re-establish Mathematics as a department on its own in the future. El Sharif has spent a great deal of time this year thinking about how to best develop Mathematics courses and the Mathematics minor towards that end. As the only current tenure-track Mathematics faculty member, he is responsible for such future development planning, along with his responsibilities for making the unit plans, scheduling classes and adjuncts, and increasing enrollment in Mathematics classes.

Stepping into her new role as provost in January of this year, Brown-Wright had developed a clear vision for her time in leadership. One of her biggest priorities is meeting student needs within the general education curriculum, particularly in first-year Mathematics and English courses. As Brown-Wright points out, these classes are gateways to the general education curriculum for students, and failure in one of these key classes can derail a student's progress. Additionally, she says, research shows that poor grades in first-year introductory courses can affect matriculation rates later on.

After considering the research data, Brown-Wright's vision for ensuring student success became even stronger. She is adamant that every student who is admitted to Wilberforce University should be given the support they need to succeed through graduation. To this end, Brown-Wright has charged El Sharif with developing a co-requisite model for



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general education math classes, and he has taken on that charge so that students can develop the foundational skills they need to complete required mathematics courses. Brown-Wright and El Sharif continue to explore options for establishing co-requisite courses within the core curriculum; they are also making plans to support underprepared students in the interim until co-requisites can be implemented.

El Sharif appreciates the trust the Wilberforce's president and provost have placed in him to update the mathematics curriculum so that it is better geared to student needs. Course offerings include Introductory Algebra, Fundamentals of Algebra, and College Algebra, as well as Pre-calculus, Calculus I, II, and III, Discrete Mathematics, and Differential Equations. In just two short years, El Sharif has now not only taught all of these established classes on campus, but he has also updated them as well.

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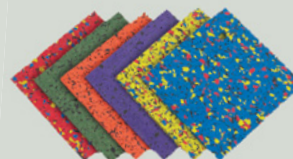


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In one case, he added over 1,000 new practice questions to a course so that the students are able to really learn the course content through consistent engagement with the material.

El Sharif says that many people know that students in majors like Engineering need to study higher math, but they may not realize that even Biology majors need calculus, and graduate students in many disciplines may need even more advanced math classes, depending on their specialization. In fact, he himself took biology classes during his time as a master's student so that he could better understand the discipline's mathematics underpinnings.

In overhauling the mathematics program, El Sharif has developed a new course designed for Wilberforce students outside of STEM: Quantitative Reasoning. He describes the course as helping students understand the math around them in their lives. Some of the

topics covered include logic, percentages, and statistics; the course also explores aspects of personal finances such as managing money, saving, assessing bank rates for mortgages, and the like. These real-world connections help students appreciate the role of math in their own lives—and the importance of learning how to use it by working with these practical applications.

Developing Smart Online Teaching Strategies

El Sharif acknowledges that online teaching is “tricky,” since students now have more tools than ever before to cheat. He believes, however, that instructors can encourage online students to do their own work through innovative assessment strategies. Since the students often own multiple electronics devices and can easily access the calculation and final solution for any problem on all of them, instructors must mitigate opportunities for students to take this easy way out.

To make it more likely that students

complete the work themselves, El Sharif focuses on a different part of the process in his online assessments. As he prepares a test question, he first runs the calculation through a generative artificial intelligence (gen AI) tool to see what answer it produces. Then, he works the problem to make sure the gen AI calculation and answer is correct. After that, he introduces a mistake to the calculation in the test question. On the assessment, he asks his students not to give the answer—the test provides that—but to find the mistake. The answers are multiple choice: “Step 1 is wrong,” “Step 2 is wrong,” and so on. While the students may still use gen AI tools as a supplement, they still need to understand the math enough to locate the error within the test time limit. Similarly, El Sharif asks students questions about graphing problems instead of simply asking them to produce the graph: “Does this answer make sense? Why or why not?” These are examples of smart innovations in online assessment. Given the continuing advancements in gen AI capabilities, however, El Sharif knows that he will need to keep developing his online teaching strategies, as well.

Brown-Wright appreciates El Sharif's strengths, saying that he “is not afraid of challenges, and he is open to change and new ideas—we need that in a leader.” With his vision for delivering a student-centered math program, focus on staying abreast of pedagogical innovations in the field, and desire to increase campus capacity through successful grant-making, El Sharif provides a model for other early-career professionals in all disciplines. The work he is doing will have a significant impact at Wilberforce and beyond for years to come.




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