Front Matter
Message from Robert P. Smart
Vice Provost for Research Administration and
Executive Director of the Center for Scholarly and Creative Excellence

It gives us great pleasure to present the 2013 Grand Valley State University McNair Scholars Journal. It is the culmination of the collaborative explorations conducted by our student scholars and their faculty mentors through our Ronald E. McNair Scholars Program. Their contributions to this journal represent the persistence and creativity of our students and the faculty mentors who exemplify the dedication of our campus to undergraduate success.

The Ronald E. McNair Scholars Program, now in its 19th year at Grand Valley State University, is a federally-funded program geared to provide research opportunities for low-income/first-generation, and underrepresented college undergraduates to better prepare them for graduate school. At GVSU, our strategic goals and values align with the McNair Scholars Program as we strive to improve both the diversity and quality of our students and prepare them for success beyond their undergraduate experience.

We would like to congratulate each of the McNair Scholars whose research is presented here. We would like to thank the faculty mentors who have worked so closely with our McNair Scholars to propel their intellectual curiosity and foster their goals and dreams. I would also like to extend my appreciation to the staff of the McNair Scholars Program; it is their dedication and hard work that help make these successes possible.

We hope you enjoy learning about the great work done by our students and their faculty mentors.

Sincerely,

Robert P. Smart Ph.D.
Vice Provost for Research Administration and
Executive Director of the Center for Scholarly and Creative Excellence
Ronald Erwin McNair was born October 21, 1950, in Lake City, South Carolina, to Carl and Pearl McNair. He attended North Carolina A&T State University where he graduated Magna Cum Laude with a B.S. degree in physics in 1971. McNair then enrolled in the prestigious Massachusetts Institute of Technology. In 1976, at the age of 26, he earned his Ph.D. in physics.

McNair soon became a recognized expert in laser physics while working as a staff physicist with Hughes Research Laboratory. He was selected by NASA for the space shuttle program in 1978 and was a mission specialist aboard the 1984 flight of the USS Challenger space shuttle.

After his death in the USS Challenger space shuttle accident in January 1986, members of Congress provided funding for the Ronald E. McNair Post-baccalaureate Achievement Program. The goal is to encourage low-income, first generation students, as well as students who are traditionally underrepresented in graduate schools, to expand their opportunities by pursuing graduate studies.

**Ronald E. McNair Post-baccalaureate Achievement Program**

**The Purpose**
The McNair Scholars Program is designed to prepare highly talented undergraduates to pursue doctoral degrees and to increase the number of individuals (from the target groups) on college and university faculties.

**Who are McNair Scholars?**
The McNair Scholars are highly talented undergraduate students who are from families with no previous college graduate, low-income background or groups underrepresented at the graduate level for doctoral studies. The program accepts students from all disciplines.

**Program Services**
The McNair Scholars are matched with faculty research mentors. They receive academic counseling, mentoring, advising, and GRE preparation. In addition to the above services, the McNair Scholars have opportunities to attend research seminars, conduct research, and present their finding orally or written via poster presentations. In the first semester of their senior year, the scholars receive assistance with the graduate school application process.

**Funding**
The Ronald E. McNair Post-baccalaureate Achievement Program is a TRiO Program funded through the United States Department of Education and Grand Valley State University.