GK-12: Graduate Fellows in Science and Mathematics Education

Project Goals and Objectives: The main goal of this project is to *educate, train and interest science and mathematics graduate students to be better teachers and communicators of STEM knowledge and methods, with K-12 teachers and students in particular, and with non-technical audiences in general*. With STEM training, participating graduate fellows will be more likely to engage the broader community in scientific issues throughout their careers and may be more interested in pursuing non-traditional careers. Over the next 5 years, we intend to achieve this goal by involving 50 graduate fellows in rich and interactive relationships with K-12 teachers from 4 urban and rural schools in Duluth, Minnesota and the surrounding area. The fellows will work with K-12 teachers to define the needs and limitations for improving STEM teaching in their schools and create a variety of innovative STEM exercises and projects for K-12 students using an inquiry-based learning process that will take advantage of the expertise and interests of graduate students in three M.S. graduate programs: *Integrated Biological Sciences*, with tracks in cellular-molecular-physiological biology and ecological-organimal-population biology; *Geological Sciences*, with areas of interest in hard-rock geology, Quaternary geology, hydrogeology, geoarchaeology, and physical and chemical limnology; and *Applied and Computational Mathematics*, with concentrations in discrete mathematics, probability, statistics, and data analysis. Our specific objectives include:

***Graduate Fellows will*:**

1. learn to successfully use inquiry-based pedagogy to teach STEM knowledge and skills.
2. appreciate the challenges, rewards and needs of K-12 education.
3. develop and share effective methods of communicating their scientific and mathematical expertise with non-technical audiences in general, and the K-12 community in particular.
4. become critically reflective teachers of STEM knowledge and skills.

***K-12 teachers will*:**

1. strengthen their content knowledge and skills in specific STEM disciplines.
2. engage students in authentic scientific and mathematical inquiry-based learning with increased confidence and effectiveness.
3. gain increased technical knowledge and resources/equipment for authentic STEM learning activities and projects in the classroom.
4. enhance their repertoire of teaching through mentoring of the graduate fellows.
5. develop productive and enduring partnerships with University faculty and graduate fellows in STEM disciplines.

***K-12 students will*:**

1. discover and learn the nature and process of scientific and mathematical inquiry by participating in a range of student-centered projects and activities.
2. gain proficiency, confidence and interest in science and mathematics.
3. see themselves as scientifically literate citizens and perhaps potential scientists through their increased understanding and appreciation of who scientists are and what they do.

Participating University staff, graduate fellows and K-12 teachers will share their experiences and results with their colleagues, parents, and the public, locally, regionally and nationally, thereby gaining a greater appreciation of the potential mutual benefits of developing and maintaining strong collegial working relationships and greater appreciation and understanding of the STEM educational resources the University of Minnesota Duluth has to offer.