

RASEM² Works to Facilitate the Choice of Students with Disabilities to Enter Science, Engineering, Mathematics, and Technology Courses & Careers

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What is RASEM Squared (RASEM²)?

The Regional Alliance for Science, Engineering, and Mathematics for Students with Disabilities — Squared (RASEM²) sponsored primarily by the National Science Foundation, is devoted to increasing the numbers of persons with disabilities who enter careers in science, engineering, math, and technology (SMET), areas of endeavor in which people with disabilities are drastically underrepresented. The irony is they that are highly adaptable, skilled people, naturally solving problems at every moment in order to survive in a “user unfriendly” environment.

RASEM² is administered by Associate Dean, Dr. Bill McCarthy, of the New Mexico State University College of Engineering. Among the partners located in far west Texas, and New Mexico are eight four-year universities, eighteen community colleges, two national labs, twelve elementary and high school regional cooperatives, and ten affiliate partners composed of a variety of state and national service provider organizations and educational organizations and schools.

The Emphasis to Achieve Goals

To accomplish its mission, RASEM, focuses in on three areas to increase awareness, provide support, and inspire the motivation to move into those fields into which we have been denied entry because of short-sightedness on the part of society as a whole:

1. Partner projects

Partners in the Alliance submit proposals to RASEM for projects that take place on their campus.

2. Teacher Mini-Grants

Grants are issued to K-12 teachers submitting proposals on a competitive basis to fund innovative hands-on activities to help students with disabilities through critical educational transitions leading to SMET career paths.

3. Mentorships

Qualified SMET college students are granted financial aid with stipends and mentorships, and act as role-models for secondary school students with disabilities.

Area of Influence

In March 2001 at the annual meeting of the American Association for the Advancement of Science, the group's president, Mary L. Good, dean of the College of Information Science and Systems Engineering at the University of Arkansas at Little Rock alerted the assembly that the United States could lose its lead in the global economy if it delays in investing more resources and enticing more students into science and engineering. What is more, "Since 1986, B.S. degrees in engineering, mathematics, and computer science have dropped by about 20 percent," a startling statistic in view of the current high-tech emphasis, but even more so for persons with disabilities. It appears that persons with disabilities are a smaller proportion of the science and engineering labor force than they are of the labor force in general. Persons with disabilities are 14 percent of all employed persons and 5 percent of employed scientists and

engineers¹.

RASEM²'s primary goal over the five years of the project will be to increase the number of students with disabilities who graduate with baccalaureate degrees leading directly to graduate training or to employment in their desired field. In order to achieve these goals, RASEM² will institute a comprehensive educational approach composed of five innovative actions field-tested by RASEM. The actions will affect students throughout the education continuum including K-12, community college, and university levels in New Mexico (NM) and west Texas (TX). The RASEM² staff will include a project monitor/data analyst and an off-site evaluator to collect data and to determine if the project is on task and if not, suggest alternative tactics.

RASEM² Based on Solid Ground

RASEM has worked extensively over the last ten years to increase the numbers of students with disabilities in SMET courses and careers. In other words, the ground work has been set to conduct this comprehensive program. For example, educational and affiliate partners in NM, Oklahoma, and west TX, including thirteen 2-year colleges, eight 4-year universities, and seven affiliate partners, have worked hard as an alliance to provide students with disabilities the opportunities to participate in positive educational experiences at the K-12 and post-secondary levels of SMET. RASEM² is now prepared to carry on with a more aggressive and focused approach.

Programs from the recently completed RASEM program on which the enhanced RASEM Squared program is based include:

1. Partner projects

Partners in the Alliance have been strongly encouraged to submit proposals to RASEM for projects that primarily take place on their campus. Examples of such projects include:

- a bridging program at UT/El Paso in which students are familiarized with college life and participate in science field trips;
- the Children's College at UNM/Los Alamos in which middle school children with disabilities and temporarily able-bodied students participate in hands-on science projects for three weeks;
- the Science summer camp at Diné Community College in which nearly 60 students participate;
- the MAVIS, Math Accessible for Visually Impaired Students, a research project designed to investigate methods of producing Brailled math text and other technical materials for use by students in the classroom. One of the objectives is to produce such material in a timely fashion, i.e., when the other students receive their materials. MAVIS later became a full-fledged project funded by the National Science Foundation for a period of three years; or

2. Teacher Outreach Program

This component of the program was formerly directed by now retired professor, Dr. Lily Chu, and current RASEM² program evaluator. Through this component, grants have been issued to K-12 school teachers to carry out innovative hands-on activities to help students with disabilities through critical educational transitions leading to SMET career paths. To accomplish this objective, projects incorporate field trips, hands-on science activities, collaboration between general ed teachers and

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Guterman, Lila. "U.S. Urged to Invest in Science Education." *The Chronicle of Higher Education* 16 March 2001. 28 March 2001 <<http://chronicle.com/weekly/v47/i27/27a02604.htm>>.

special ed teachers, schools, and community organizations and businesses. Examples include a project in which students built their own telescopes, toured the VLA, and actually took a field trip in which they used their telescopes to take night readings of the sky. In other projects students learned or improved such skills as planetary and astronomical science, aerodynamics, computer skills, math, functional math skills, life sciences, construction/design, and blueprint reading.

To prepare for writing the proposals teachers attended grant writing workshops conducted by Dr.Chu. At the end of the project teachers are required to share their experience through conference presentations, newspaper/journal/magazine articles, etc. Collaboration between school districts and local organizations such as community colleges or universities, is also encouraged. Cost sharing is also an important ingredient for a successful project

3. Mentorships

Qualified SMET college students have been granted financial aid through stipends and mentorships, and have acted as role-models for secondary school students with disabilities while maintaining email contact with them and their teachers. College students with disabilities enrolled at any of the RASEM² partners may apply for the \$2,000/calendar-year Mentorships or the \$750/calendar-year Stipends. Mentors must maintain a satisfactory academic standing and mentor secondary school students with disabilities. Stipends are awarded for performing work assignments at the Regional Center. RASEM² also helps secure personal care attendants, technical readers, interpreters, notetakers, and science, engineering, and/or math (SMET) tutors for RASEM² students. Direct funding for these services are provided by RASEM²'s NMSU headquarters. Precollege students with disabilities can apply for \$20/month/academic year stipends pending participation in SMET activities at their schools, through RASEM² sponsored SMET summer activities, and satisfactory academic achievements in the following academic year.

Alliance is the Key Concept

Alliance is the key concept and element of RASEM². Without strong connections and common goals, developing an underutilized human resource — persons with disabilities — our aspirations will fall short especially with a project that spans a geographically large area encompassing urban as well as rural educational institutions. To prepare, partners have been briefed and letters of support have been received from eighteen 2-year NM community colleges, six 4-year colleges and universities in NM, and ten NM school district cooperatives, two 4-year universities in west Texas and two educational service centers representing school districts from El Paso, Texas east to the Pecos River and south to the Rio Grande. The combination is compelling as it can greatly influence a culturally diverse, economically impoverished constituency which represents a target population of students beginning with grades K-12, where students are often discouraged from pursuing SMET courses and careers; continuing through 2-year community colleges where students enroll to make up for academic deficiencies before continuing their education at 4-year colleges or universities.

As strong connections and common goals can motivate people into action, strong personal face-to-face contact between members of the group can sustain their enthusiasm through disheartening circumstances. Unfortunately, the distances make it impractical to provide on-going oversight, assessment, and assistance. RASEM² proposes to overcome this hurdle by hiring and training three or more coordinators to serve the areas where they live — northern NM, including Albuquerque; southern NM, including Las Cruces; and west Texas including, El Paso and Midland. They will work to strengthen existing ties or develop new ones with the public schools in their areas, facilitate bridging between the higher education institutions and public schools, and promote summer programs in their areas.

The Enterprise Hinges on Six Actions

Augmenting this approach will be activities to develop research experiences and the support services needed to recruit students with disabilities into SMET education and career development activities throughout their years of academic training. Strategies will also be in place to reduce the barriers that inhibit the interest, participation, retention, and advancement in SMET education careers for persons with disabilities. The enterprise hinges on the following six actions:

- 1. Hands-on science experiences in pre-college science education environments.**
 - Recruit & identify promising students with disabilities for more intense SMET experiences;
 - Groom student participants as RASEM² "Challengers";
 - Conduct Summer Science Institutes;
 - Conduct Teacher Outreach Projects;
 - Recognize and reward pre-college teachers;
 - Expand the network of scientists, engineers and SMET corporate partners.

- 2. Formal research experiences as undergraduates and graduates.**
 - Provide stipends to faculty members who employ a RASEM² student on their research project;
 - Encourage Senior Challengers to present at the annual RASEM² or NM-AMP gathering;
 - Develop, in collaboration with the Laboratories, additional financial support for researchers to hire students with a disabilities;
 - Encourage Senior Challengers to seek out "Hot Projects" or similar research opportunities.

- 3. Preparation of faculty for full participation of students with disabilities in a SMET curricula.**
 - Create a two-tiered system of professional response teams to service students with disabilities;
 - Involve partners and relevant agencies to identify qualified persons to serve on response teams;
 - Hold annual response team training seminar in conjunction with "Vision to Reality" conference;
 - Generate on-demand professional development seminars on teaching students with disabilities.

- 4. Bridge programs between academic levels.**
 - Teacher Champions inform colleagues and students, coordinate mentoring activities at their schools, and identify promising students;
 - Junior Challenger's Clubs introduced into the public schools and Challenger's Clubs into institutions of higher education;
 - Parent Champions provide support, advocacy, and community awareness.

- 5. Mentoring by successful SMET professionals and SMET students with disabilities.**
 - Network of college students with disabilities mentor high school students with disabilities who mentor middle school students with disabilities;
 - RASEM² sponsors gatherings where mentors and mentees meet face-to-face;
 - Mentors and mentees participate in SMET activities with bonding as the desired outcome.

- 6. Securing co-op, summer internships, and professional employment.**
 - Senior Challengers seek summer internships or co-op positions with SMET based corporations or public entities;
 - RASEM² and partners' offices of placement and career services open lines of employment (internships, co-ops, or permanent positions) with large numbers of SMET employers;
 - RASEM² expands network of corporate supporters.

Professional Development Assures Student Development

Crucial to the success of the RASEM² is the understanding that it must include all the stakeholders and

that lines of communication between providers of educational services and students must be kept clear in order that a least restrictive environment be employed. Two of the stakeholders include the students, who “demand” accommodations are frustrated having to fend for themselves while their classmates move on, and the faculty, who, when confronted with requests for accommodation that seem to be out of line with the virtues of fair play, frequently are at a loss for how to respond.

One approach to understanding is through a workshop that addresses the questions of rights and responsibilities attributed to both students and faculty. According to Dr. Larry Sharp, Coordinator, Counseling & Disabled Student Services, Doña Ana Branch Community College,

“The spirit of the Americans with Disabilities Act (ADA) civil rights law is to increase interest, participation, recruitment, retention, advancement and employment of persons with disabilities. Much of the work must be accomplished through higher education. How we carry out the tasks of teaching and learning is paramount to success.

“Treatment of students with disabilities under both Section 504 and ADA involves providing persons with disabilities the same opportunities to access and use services as non-disabled persons. That means:

- All student programs, activities and services shall be operated "in the most integrated setting appropriate" for persons with disabilities.
- In order to evaluate discrimination in the treatment of students in general, it is recommended that all information and materials pertaining to aid, benefits or services provided to students be reviewed.
- Programs and activities that are not operated wholly by the institution include the requirement that all programs or activities that are not so operated (that are operated by organizations or persons other than the institution) include opportunities for participation by persons with disabilities that, as a whole, are equal to those of non-disabled persons. In cases where "outside" organizations or persons provide programs, activities or services to students, the institution of post-secondary education must make certain that, as a whole, equal opportunities exist in each such program, activity or service.

“While all levels of faculty and staff are involved, the challenge of how we are involved brings up multiple questions for us all:

- What are the rights and responsibilities of students declaring disabilities?
- What are the rights and responsibilities of staff responding to student requests for accommodation/modification?
- What are the rights and responsibilities of faculty teaching students with disabilities?”

As RASEM² moves on to achieve its goals, it will hold regular workshop/conferences featuring nationally and regionally recognized authorities to discuss the answers to these and other relevant questions.

Where to from Here?

To reiterate, students with disabilities are critically underrepresented in science, engineering, mathematics, and technology careers (SMET). Perceived as ineffective in meeting the intellectual and physical demands of SMET, their natural problem-solving skills, a characteristic of successful SMET professionals, are overlooked. Achievement by SMET students with disabilities is relegated to the miraculous or anomalous - their efforts met with indifference or patronization. Routinely waived from hard core science courses, advised against SMET careers, they are discouraged from indulging in dreams

other than those that are “commensurate with their disability” rather than their abilities.

However, different perspectives, talents, and experiences produce better ideas and ultimately better goods and services to meet the needs of increasingly diverse markets for products and services in the United States and abroad. Our Nation needs the most from its human resources. Indeed, we need the talents of all our citizens if science, mathematics, and engineering are to remain a hallmark of America’s excellence².

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National Science Foundation. (1999). *Women, Minorities, and Persons with Disabilities in Science and Engineering: 1998*. (Report No. NSF 99-338). Washington, DC: National Science Foundation.

Brief BioData

Ed Misquez

Ed Misquez is the Co-PI and Associate Director of the Regional Alliance for Science, Engineering, and Mathematics — Squared, for Students with Disabilities (RASEM²), a program established to promote careers in science, engineering, and mathematics for persons with disabilities. He has an associates degree in engineering technology and a masters degree in technical and professional communication. Over the 14 years, he has been an advocate for and involved in programs for persons with disabilities in New Mexico and helped establish the first independent living center in southern New Mexico.

William C. McCarthy

Professor McCarthy, associate dean of the New Mexico State University College of Engineering, is also a Registered Professional Engineer in New Mexico. A wheelchair user himself, he works with students with disabilities as Project Director and Principal Investigator and for the National Science Foundation-funded Regional Alliance for Science, Engineering, and Mathematics — Squared, for Students with Disabilities.

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