



REFLECTIONS

GraSUS Newsletter • Fall 2007

NDSU GraSUS - II

(Graduate Student-University-School Collaborative for Science, Mathematics, Engineering and Technology)

Mission

The mission of the NDSU GraSUS-II program is to enhance science and mathematics education in grades 6-12 through the direct involvement of graduate and advanced undergraduate students in SMET (science, mathematics, engineering, technology) disciplines.

The program also provides support and enhanced professional development of science and mathematics teachers.

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Upcoming Events

- NSTA Area Conferences
 - December 6-8, Southern, Birmingham, AL
- AAAS Annual Meeting
 - February 14-18, 2008, Boston, MA
- 8th Annual NSF GK-12 Meeting
 - February 29-March 2, 2008, Washington, DC
- T3 International Conference
 - February 29-March 2, 2008, Dallas, TX
- NSTA National Conference
 - March 27-30, 2008, Boston, MA
- NCTM Annual Meeting
 - April 9-12, 2008, Salt Lake City, UT

Dates to Remember

- December 10-14 – Finals Week
- December 17-January 7 – Semester Break

GraSUS-II is supported by the GK-12 program of the National Science Foundation (Project #DGE-0338128) and by North Dakota State University and The Center for Science and Mathematics Education.



NDSU

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GraSUS – Great Beginning

I have to admit that, at the time, I thought it was a bit nutty. The National Science Foundation had established some program called GK-12 to put STEM graduate students into Grades 6-12 classrooms? And this would benefit middle/high school students, their teachers, graduate students, and university faculty? Not only this, but there was a group of highly motivated, pragmatic STEM faculty from our campus that was going to go for one of these grants, even though the primary benefit would go toward K12 students and teachers – and not toward their own research programs and labs?

That was back in 2000. I was invited to join the leadership group, and my initial hesitancy quickly dissipated with their enthusiasm and creativity. As newly-appointed director of the Center for Science & Mathematics Education, they asked if I could not only help in their administration of this broad, collaborative project (spanning multiple colleges and departments) but help disseminate its presence through publications and the internet.

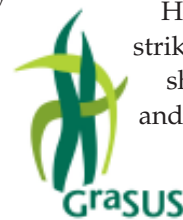
First thing: we needed a logo!

The leadership group had already come with “GraSUS” for the project’s name: a merger of the three entities (“graduate student – university — school”) with the



Dr. Donald Schwert is the Director of the Center for Science and Mathematics Education and a Professor in the Department of Geosciences. He serves as a Co-PI for the GraSUS Project.

symbolism of the prairie grasses of the Red River Valley region. Coincidentally, the Center was administering another NSF project here for which we were employing a graphics illustrator, Shannon Tomac. Shannon was a Bachelor of Fine Arts student from Minnesota State University-Moorhead. She agreed to take a stab at creating the logo.



Her proposal was simple and striking: blades of grass in three shades of green, intertwined, and grounded in the program’s name. The three colors represented the three entities, closely intertwined in partnership, growth, and interdependency.

That logo so represents what the program has been all about – the closest collaboration ever of STEM faculty with the K12 science community in our region. And the engagement of our teachers, faculty/staff, and graduate students, together with

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A New Endeavor for GraSUS: Collegial Study Groups

What is the impact of the GraSUS project? Have our efforts over the past six years made any differences in our schools? Are we improving student knowledge of science and mathematics? Have we promoted student interest, engagement and positive attitudes toward science and mathematics? Have teachers, fellows, and faculty members changed their views of teaching and learning science and mathematics?

Are effective new instructional strategies being used by participants?

These are questions that we have tried to answer during each year of the GraSUS projects. Each year with guidance from our external evaluator, Debra Tomanek of the University of Arizona, we collect information about project activities, their impact on student learning, and impressions of the effectiveness and impact of the project from all participants. We have an extensive collection of enrichment activities that have been developed and used in many area middle and high schools. Summer academies and monthly seminars throughout the school year have provided opportunities for participants to encounter new ideas, share experiences, and reflect on the GraSUS project.

While our annual reports provide documentation of project activities and impact, a challenge over the years has been to provide extensive data that support the positive impressions of the impact of GraSUS on students and participants. This year we decided to implement a new mechanism to help faculty, fellows and teachers more carefully document and reflect upon the project's impact. That mechanism is what we call Collegial Study Groups. These are based on a successful and widely implemented process used for school improvement: Whole Faculty Study Groups (Murphy and Lick, 2005).

The primary goal for our collegial study groups this year is to use data on student learning and attitudes to



Bill Martin is Professor and Head in the NDSU School of Education and a Professor in the Department of Mathematics. He serves as Co-PI for the GraSUS Project.

(a) help us develop appropriate enrichment activities that we expect to meet identified needs and (b) help us document the extent to which the activities did lead to student learning and positive attitudes about science and mathematics. Each of the five study groups is composed of 2-3 teacher-fellow pairs and a faculty member from the project leadership group. Study groups will meet bi-weekly to discuss and reflect on the impact of GraSUS activities.

The collegial study group concept was a central focus of the second Summer Academy. The framework for CSG activities this year was established, groups were formed on the basis of participant interests and preferences, and initial meetings focused on developing an action plan for the group. Collegial study groups have rotating leadership and shared responsibility for producing and reflecting on student learning data – the focus of activities is to be on documented student needs that can be addressed through GraSUS activities and resources. Groups will determine how best to document impact on pedagogy, attitudes, and student learning.

In addition to the hour long meeting every other week – which replaces – GraSUS will hold three large group meetings (Fall, Winter, and Spring) to allow participants to share information about GraSUS activities and the impact of the collegial study group process.

– Bill Martin

GraSUS-II Advisory Board

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"In Their Own Words" ~ 2006-2007 Fellows Share Their Thoughts

What were the greatest rewards and challenges of being a GraSUS Fellow?

"The greatest reward was earning the respect and friendship of several of my students. The greatest challenge was instilling a love of science in my students separate from their desire to earn high scores."

How do you think GraSUS impacted you in terms of your successful start in your career?

"Although this is not officially a teaching position, I have opportunities to give lectures and lead classroom activities. My time management skills were improved during my year in GraSUS. Further, I have given successful interview and exit seminars since ending my GraSUS fellowship. My comfort and speaking style improved greatly after my frequent lectures and introductions last year."

Evan Lampert is currently a postdoctoral research associate in Ecology and Evolutionary Biology at the University of Colorado, Boulder. He worked as a GraSUS Graduate fellow at Kindred High School with Bob Taylor.



Did you have any particularly memorable experiences?

"One project I created was on a topic that the teacher said all of her previous classes had struggled with. While the students were working on the project I was walking around helping when needed. I overheard one student say "That's where that comes from!" The student had discovered why a formula worked which was one of the major goals of the project."

How did your experience contribute to the GraSUS goal of "Strengthened Partnerships Between NDSU and School Districts"

"I feel that I had a good relationship with all of the staff at the school I was placed. The staff there viewed me as a person with direct ties to NDSU. I think I portrayed a good image to them. Also, when we presented our experiences at NDSU I had the opportunity to talk to many NDSU professors and share what I was doing and what the GraSUS program was about. Many of them offered their services to me to use when creating projects for the school district. Finally I saw a lot of NDSU faculty coming to the GraSUS meetings . . ."

Dana Powell was a GraSUS undergraduate fellow last year. She worked with Michelle Bertsch at Fargo North High School. She is currently working on completion of her Education course requirements in preparation to student teach this spring.

How do you think GraSUS impacted you in terms of your successful start in your career?

"GraSUS has made me confident that I would like to teach in some form. I will most likely do this at the college level, but I enjoyed my experience with GraSUS."

Daniel Eiler is currently pursuing his PhD. in Biochemistry at Yale. He worked as an undergraduate fellow with Joe Bailey and Aaron Tank at West Fargo High School.



How did the experience compare to what you expected?

"The experience was as I anticipated . . . except I did not anticipate two things. First, the relationships that grew out of my GraSUS experience were incredible and unforgettable. The GraSUS project provides a very supportive environment between all members to grow and learn from one another as educators. Second, I gained experience and confidence in my abilities as an educator thanks to the influence of Carol Beaton, my teacher."

What were the greatest rewards and challenges?

"The greatest reward was my experience working in Carol's classrooms and the confidence in myself that I gained through this experience. The greatest challenge was keeping up with what was going on in the classroom since I was only there 2 days per week."

Did you have any particularly memorable experiences?

"I will not soon forget when I presented my research poster at the GK-12 National Convention in Washington, D. C. in the atrium of the National Science Foundation headquarters. That was a tremendous experience in addition to participating in the conference itself."

Darci Block is working on her last two years of a chemistry PhD at NDSU. As a result of her GraSUS experience, she enrolled in an Introduction to Teaching College course this semester and is considering a career teaching at a four-year college. She worked at Fargo South High School with Carol Beaton.



GraSUS Collaborations – Paying Big Dividends

How will you continue to integrate an aspect of GK-12 and your partnership with university students into your teaching, philosophy, etc.?

“I am a big believer in student-centered instruction. The GraSUS program allows me to have access to more activities that have students play a more active role in the classroom. The role modeling that is provided by the GraSUS students has been a wonderful thing for my students to see.”

– *Shane Alderman, Biology Teacher,
Fargo South High School*

“The activities we develop in GraSUS do not go away when the fellows do. Many of the activities currently being used in our high school’s sophomore biology program and environmental science classes are from past GraSUS fellows. Each

year we add more enrichment to our curriculum with this program!”

– *Sara Forness, Biology and Environmental Science Teacher,
GraSUS Lead Teacher,
West Fargo High School*

“The labs Kristin is making “user friendly” will continue to be part of my curricula. And having a new angle of approach from a new direction will help keep me current and rejuvenated.”

– *Lois Ewertz, AP Physics,
Physics, and Chemistry Teacher,
Fargo North High School*

“It seems that each year my fellow has an expertise in an area of biology that is not my strong point. I use them as a co-teacher to enhance the education of my students and to keep me learning. I think I learn as much, if not more than my students. Each year we look over what we have done in previous years and if



Emily Davenport and Bob Taylor
at Kindred High School

we agree to use it, modify it and proceed. This year we are including areas of the N.D. assessments that our students need to bring up.”

– *Bob Taylor, Anatomy/Physiology,
Biology, Earth Science Teacher, Kindred*

GraSUS – Great Beginning

continued from page 1

constructive external evaluation, has led GraSUS into a leadership example of success among the now-many GK-12 programs, nationwide.

Whatever initial hesitations I once had, it’s difficult for me today to imagine STEM education in our region without GraSUS being part of it.



Cooperative learning
makes the difference

What do you enjoy most about the GraSUS/GK12 experience?

"I absolutely look forward to the exchange of ideas. Each time I come away from one of our meetings, I feel so motivated to try something new. This is especially appreciated after working with some difficult ninth graders. There are days when you feel that nothing can motivate them, and it can be very depressing. Just at the time of despair, we have a meeting and I am reinvigorated and actually excited to try a new idea. Sometimes it is simply necessary to discuss various challenges that we face on a daily basis. Thanks to NDSU and the GraSUS program for helping make me a better teacher."

– Mary Jo McKay, *Introductory Algebra Teacher, West Fargo Sheyenne Center*

"I like the alternative interaction with the students that occurs with having another person in the room. His interaction is different than mine. Also an extra pair of hands helps, as does having someone to bounce ideas off of. We have come up with more "fun ideas" and I think increased the understanding that the students have of science."

– Kathy Antonelli, *Chemistry and Physical Science Teacher, West Fargo High School and Sheyenne Center*

"The students are single-handedly the most enjoyable part of my experience. Watching them draw conclusions and find importance in the topics we discuss is very rewarding. Even more rewarding, is being present during what Shane calls "teachable moments" – when the students become excited about something for the first time."

– Maggie Wallace, *Undergraduate Fellow, PharmD*



Becky Andres works with biology students at West Fargo High School

"I really enjoy working with the kids. It is rewarding to teach them something I know, and have them remember it. I also enjoy working my two teacher partners, Sara Forness and Jill Wold. They are both so enthusiastic about science and teaching, it really inspires me."

– Becky Andres, *Graduate Fellow, Entomology*

"The constant flow of ideas across curriculum, grade level and geographical divides, especially between college and high school."

– Joe Kennedy, *Algebra II and Geometry Teacher, Fargo South High School*

"What I'm helping. I want to be a good role model and encourage these kids to go into engineering (or math/science). It's exciting to see when they do have interest in these topics. It seems like the U.S. needs more young people with a passion to excel in math, science and engineering."

– Maddy Steffenson, *Undergraduate Fellow, Civil Engineering*

"Working with the students. I also get to work on a subject (physics) that I love so I am learning as much as the students are. I also have a great teacher to work with and enjoy being able to teach others."

– Kristin Moorhouse, *Undergraduate Fellow, Civil Engineering*

Mark Loidolt uses real-world engineering problems to teach mathematical concepts





Kristin Moorhouse assists Fargo North physics students

"I am amazed at each fellow's excitement and willingness to help students. The fellows are truly concerned about the learning and success of each student and work very hard to create activities that are engaging and focus on increased student achievement. Becoming a role model for the students is an added benefit the fellow brings to the classroom as a result of working with the students consistently and sharing successes with them."

– Michelle Bertsch, Algebra I, Algebra II and Advanced Math Teacher, GraSUS Lead Teacher, Fargo North High School

"The ideas they bring from other aspects of life."

– Laura Preston, Math Teacher, West Fargo High School

"I really enjoy the challenge of coming up with various projects that incorporate the subjects we are covering as well as real life examples. I find it extremely exciting to present basic engineering problems to the class and watching them solve them. I also enjoy the students and their reactions to what I am presenting."

– Mark Loidolt, Undergraduate Fellow, Civil Engineering

"I enjoy helping students find biology topics to be relevant to their world, so that they will learn to observe science going on around them and to think critically about their world. I also enjoy sharing my research and college experiences with them, to bring the academic and research world into their classroom."

– Emily Davenport, Graduate Fellow, Zoology

"The people I have worked with have been the best part of the GraSUS project. The instructors I have helped have shown great enthusiasm for teaching, and truly care about the students' success. The best parts of my days at Fargo South are spent with the students. I like to help them with problems and concepts, as well as talking about their future plans."

– Greg Owen, Graduate Fellow, Electrical Engineering



Engineering "Iron Scientists" Academy 07



Steve Kennedy and Greg Owens conduct a balloon launching activity at Fargo South

How is your research integrated into your GK12 experience?

“One example of this is I am able to carry out one of last year’s projects with ease. This project involves collecting invertebrates from two different rivers, as well as water and substrate. These samples will make up two “ponds” in the classroom. Students will learn about biodiversity in an aquatic environment. While not about bees, I do work in the biodiversity arena, and will be able to bring my experiences with this concept to the classroom.”

– *Becky Andres, Graduate Fellow, Entomology*

“My research integrates very well in to the 11-12th grade Applied Chemistry and 9th Physical Science, mainly due to the extensive chemistry that is utilized to

determine characteristic of water and wastewater.”

– *Christopher Hill, Graduate Fellow, Environmental Engineering*

“Since I’m working in a math classroom, having a background in physics allows me to offer something to the students I work with. This is useful because it is an opportunity to show the students ways that the math they are learning can be applied in real world situations.”

– *Mason Swanson, Undergraduate Fellow, Physics*

“When the students were reviewing area and perimeter concepts, I integrated a house plan design project in which the students developed floor plan designs based on specific square footage requirements.”

– *Jack Kiger, Undergraduate Fellow, Architecture*

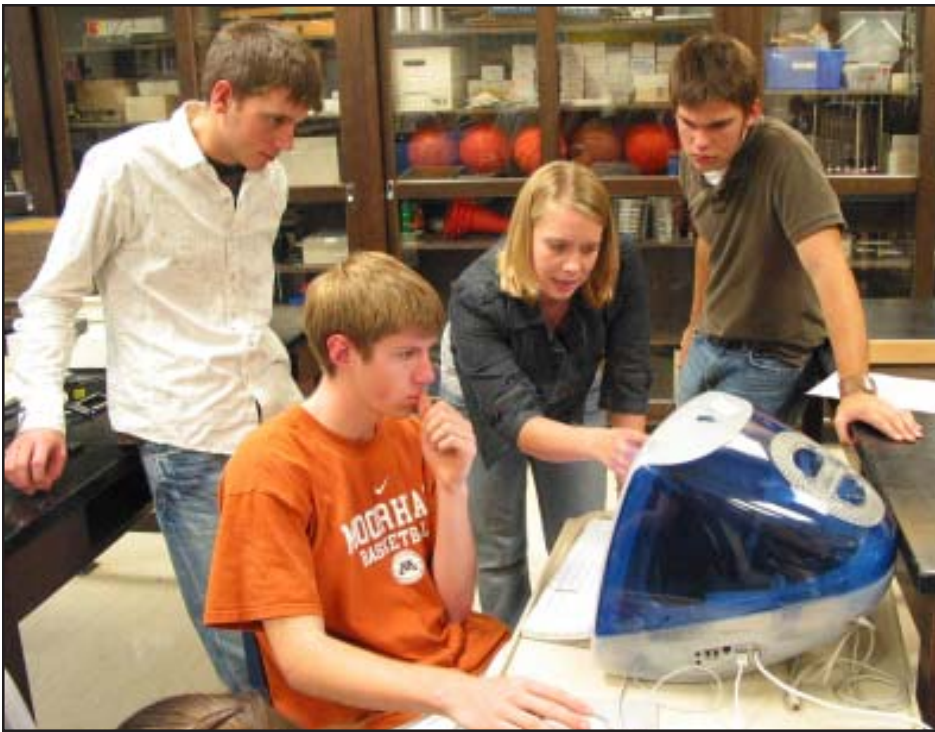
“Civil Engineering deals with a large amount of math. Most all the different problems we do have math incorporated in them, therefore I can bring many real life examples of how math is used. Also engineering deals with a lot of physics as well. Like math, I see many real life examples and can think of projects that incorporate physics. The areas of Math and Physics are some of my favorite and interesting subjects which I enjoy bringing to the class room.”

– *Mark Loidolt, Undergraduate Fellow, Civil Engineering*

“Because of my research into the deeper root of mathematical concepts in algebra, I am sometimes able to explain the basic problems in great detail. In addition, I have compiled a list of challenging problems for the more advanced students that go beyond the standard lesson plan in difficulty. Lastly, I plan to explain factorization



GraSUS participants trying a GraSUS activity



Maddy Steffenson works with physics students at Moorhead High School

with an activity, one which gives importance to the fundamental theorem of algebra.”

– Carl Hashbarger,
Graduate Fellow,
Mathematics

– Greg Owen,
Graduate Fellow,
Electrical Engineering

my students. GraSUS has helped me put more real world application into many areas of my curriculum, which definitely adds interest for students.”

– Sara Forness, Biology and
Environmental Science Teacher,
GraSUS Lead Teacher,
West Fargo High School

“My participation with GraSUS has enhanced and enriched what happens in my classroom. Not only have I benefited from the partnership but so have my students and fellow teachers as well.”

– Cindy Bondy, Biology and
AP Biology Teacher,
Fargo South High School

“It has reminded me of what my students need to be successful at the next level. My curriculum has changed each year as I learn just what is required for entry level college science courses. This is important as we are a small school with very few resources and the vast majority of our students go onto college. I want to make sure that their Kindred science education is at least equal, if not better than the competition they will face in college.”

– Bob Taylor,
Anatomy/Physiology, Biology,
Earth Science Teacher, Kindred

How has the GK-12 experience changed you, and how has your participation changed the GK-12 project?

“I am a more well-rounded teacher because of GraSUS. I have learned skills in (microbiology, for example- a discipline for which I never received training in college) many subject areas that I must teach about each year. Every fellow brings with him/her an expertise I try to soak up- so I can have more real world ideas and examples to share with



Megan Wolf
and
Cindy Bondy
at Fargo
South



Chris Hill at the Sheyenne Center



Maggie Wallace
and
Shane Alderman
at Fargo South

“Many activities have been developed and shared with other faculty members over the years I have been in GraSUS. These projects are used year after year to enhance the student learning.”

– Steve Kennedy, AP Physics and Physics Teacher, Fargo South High School

“My view of education has broadened in scope due to my GraSUS II experience. Participating both locally

and regionally with other teachers who share similar goals with respect to improved science education is rewarding.”

– Eric Tollefson, AP Physics and Physics Teacher, Moorhead High School

“Because of my GraSUS experience I find myself looking for more activities for my classes.”

– Jerry Christiansen, Physics

GraSUS-II Project Personnel

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College of Science and Mathematics, NDSU

William Martin

Interim Chair, School of Education, NDSU

Edward Deckard

Plant Sciences, NDSU

Canan Bilen-Green

Industrial and Manufacturing Engineering, NDSU

Lisa Montplaisir

Biological Sciences, NDSU

Michelle Bertsch

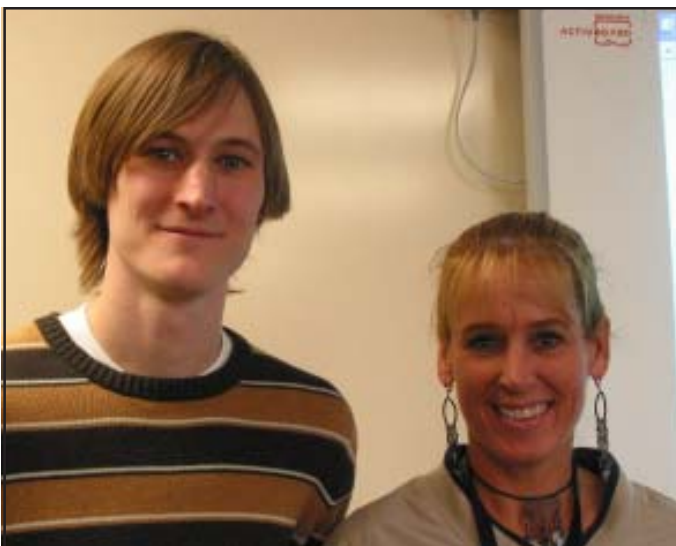
Lead Teacher
Fargo North High School Math Teacher

Sara Forness

Lead Teacher
West Fargo High School Biology Teacher

Steve Kennedy

Lead Teacher
South Fargo High School Physics Teacher



Mason Swanson
and
Michelle Bertsch
at Fargo North

GraSUS Fellows Notable News

Becky Andres (07/08)

Becky will be competing on the Linnaean games team at the upcoming ESA (Entomological Society of America) meeting. The team won the North Central Branch competition, and now will be competing for the National Championship. This is a knowledge bowl type competition about Entomology.

Joe Allen (06/07)

Joe is currently a full time science instructor at Cankdeska Cikana Community College in Fort Totten, N.D. He will be starting work on his PhD at the University of Manitoba in January.

Emily Davenport (07/08)

Emily is the recipient of the 2007-08 Harvey Nelson Scholarship and was also awarded the Outstanding Biological Sciences Graduate Student Award for 2006-2007.

Daniel Eiler (06/07)

Daniel was selected as the commencement speaker for the Spring 2007 Commencement Exercises. Daniel is currently pursuing his PhD. in Biochemistry at Yale.

Carl Hashbarger (07/08)

Attended the KUMUNU Commutative Algebra Seminar on September 8th and 9th in Lincoln, Nebraska.

Chris Hill (07/08)

Chris was a member of the NDSU team that competed in the 2007 WEFTEC (Water Environment Federation) National Student Design Competition. The NDSU team took first place honors.

Kristin Moorhouse (07/08)

Attended the SWE (Society of Women Engineers) National Conference in Nashville, TN.

Andrew Podoll (06/07)

Andrew is currently pursuing a Master's degree in Geology at Southern Illinois University at Carbondale. Andrew was awarded a HEART GK-12 Graduate Fellowship and is working in a Carbondale area school.

Maggie Wallace (07/08)

Attended the Academy of Student Pharmacists Midyear Regional Meeting in Minneapolis, MN.

Haley Watson (06/07)

Haley has been selected as the commencement speaker for the Fall 2007 Commencement Exercises. Haley will be entering Graduate School at Washington State University to pursue a Master's degree in Environmental Engineering.

Megan Wolf (07/08)

Megan has been accepted into the Optometry program at Pacific University in Forest Grove, Oregon. Megan will begin her studies next fall.

Acknowledgements

The GraSUS Project graciously acknowledges the generous support of:

The National Science Foundation

North Dakota State University

The GraSUS-II Project also graciously acknowledges the support and participation of teachers and administrators in cooperating schools:

Fargo North High School

Fargo South High School

Kindred High School

Moorhead High School

Sheyenne 9th Grade Center (West Fargo)

West Fargo High School

GraSUS-II Teacher-Fellow Teams 2007-2008

Teacher Name	Fellow Name	Subjects
Kathy Antonelli (West Fargo HS/Sheyenne Ctr.)	Christopher Hill (Environmental Engineering – Graduate)	Chemistry, Physical Science
Joe Kennedy (Fargo South)	Carl Hashbarger (Mathematics – Graduate)	Geometry Algebra II
Sara Forness Jill Wold (West Fargo HS)	Becky Andres (Entomology– Graduate)	Biology, Environmental Science, Physical Science
Steve Kennedy (Fargo South)	Greg Owen (Electrical Engineering – Graduate)	AP Physics, Physics
Bob Taylor (Kindred HS)	Emily Davenport (Biological Sciences – Graduate)	Biology, Anatomy / Physiology, Earth Science
Lois Ewertz (Fargo North)	Kristin Moorhouse (Civil Engineering – Undergraduate)	AP Physics Physics
Cindi Bondy (Fargo South)	Megan Wolf (Biology/Pre-Optometry – Undergraduate)	AP Biology Biology
Michelle Bertsch (Fargo North)	Mason Swanson (Physics, Mathematics – Undergraduate)	Algebra II, Advanced Math, Algebra I Conclusion
Eric Tollefson (Moorhead HS)	Maddy Steffenson (Civil Engineering – Undergraduate)	Physics
Shane Alderman (Fargo South)	Margaret Wallace (Pharmaceutical Sciences – Undergraduate)	Biology
Jerry Christiansen (West Fargo HS)	Mark Loidolt (Civil Engineering – Undergraduate)	Technical Math
Mary Jo McKay (WF Sheyenne Ctr.)	Jack Kiger (Architecture – Undergraduate) Laura Preston (West Fargo HS)	Intro to Algebra

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