



Minnesota
STATE COLLEGES
& UNIVERSITIES

INSTITUTION

PROJECT/REQUEST

LOCATION

Anoka-Ramsey Community College

Cambridge,
Coon Rapids

Biomedical Device
Manufacturing

\$1,500,000

Project at a Glance

- Meet expanding industry needs in the biomedical device manufacturing fields
- Expand biomedical technology education to accommodate the rapid pace of technological change
- Provide options in biomedical device technology education to serve traditional degree-seeking students, degree-holders who need to update skills and retrain dislocated workers with varied skill sets

Project Description

Minnesota is home to some of the world's largest biomedical device manufacturing companies:

- Medtronic (\$7.6 billion in annual sales)
- 3M's Medical Products division (\$3.5 billion in annual sales)
- Saint Jude (\$1.5 billion in annual sales)

Source: Dunn & Bradstreet's "Corporate Report Fact Book 2003."

Minnesota also is home to manufacturing and research and development operations for other industry leaders, including Guidant and Boston Scientific, plus hundreds of small to midsize firms that have grown and thrive in the Minneapolis-St. Paul region.

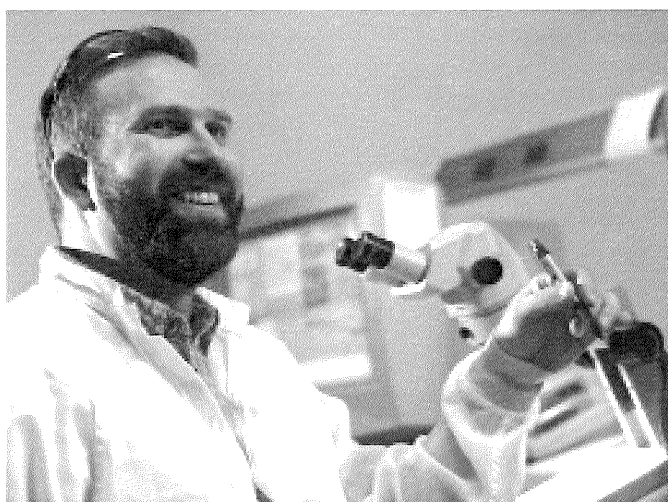
Anoka-Ramsey Community College has developed unique academic programs serving this industry including:

- High-end clinical research professional certificate program
- Biomedical technologist associate degree
- Biomedical technician certificate program

This project will support expansion of the college's credit programs to better serve the biomedical device manufacturing industry, accommodate the rapid pace of technological change and provide a higher education option for traditional degree-seeking students looking to work in the industry, degree-holders with work experience in software design, computer applications, engineering and health care, and dislocated workers.

Proposed program initiatives to serve industry needs include:

- Developing a clinical data manager certificate program. Clinical data management is a new skill mix that combines clinical research, software development, database management, and an understanding of complex regulatory and insurance reimbursement requirements.



David Yalch, senior manufacturing technician at Medtronic, Inc., entered the biomedical field as a graduate of Anoka-Ramsey Community College.

It is essential for companies of all sizes that are developing, designing, prototyping or preparing to market new or re-designed products.

- Design a center for microsurgery and telemedicine. This is an important new arena for health care providers and medical device professionals that has arisen due to the development of long-term implantable health-monitoring devices and the ever decreasing size of medical devices. The center is used for research of pharmaceuticals and medical devices. Further, the center is anticipated to be used for monitoring chronic health conditions in humans.

- Create national skill standards. All of Minnesota's large and many small and midsize medical device companies have national and international operations, vendors and service or equipment providers. Yet, there is no current method of assuring consistent education for individuals entering the industry. Anoka-Ramsey Community College through its partnership with the Medical Device Cluster group (funded through the U.S. Department of Education) is ideally suited to lead the effort to create national and international skill standards.

Anoka-Ramsey Community College: A Strong Business and Industry Partner

Anoka-Ramsey Community College, with campuses in Cambridge and Coon Rapids, is committed to developing relationships with business and industry that are mutually beneficial and that contribute to the long-term growth and success of the business or industry. The college benefits as well by gaining insight into evolving technologies and other drivers of industry change that inform college curriculum, ensuring that graduates are well-prepared for entering the workforce.

The college is engaged with business and industry through:

- Identification of training and development needs and resources.

Customized training specialists assist business and industry with training and consulting. Specialists work with companies to deliver educational or training programs at the worksite or on campus. The college offers flexible credit, noncredit and customized programs and sources to meet business and industry's needs.

- Enhancing economic development locally and statewide.

In order to remain a world-class competitor in the global marketplace, Minnesota must develop a world-class workforce. Anoka-Ramsey Community College works with local governmental agencies and the Anoka County Economic Development Partnership to address these challenges. The college provides learning opportunities for the beginning worker, dislocated worker and incumbent worker to enhance business growth and employee productivity.

- Participation in Chambers of Commerce.

Anoka-Ramsey Community College participates in civic organizations such as Rotary, Kiwanis, North Suburban Women's Club, Lions and more. Participation in these endeavors demonstrates commitment to the long-term growth and sustainability of the many communities served by the college.

- Placement of skilled employees.

Business and industry hire students as interns and graduates as employees. Some students choose to transfer to other colleges to complete bachelor's degrees; these students also fit employment needs of area companies and have been hired while they continue their education.

Lead Institution:

Anoka-Ramsey
Community College
www.anokaramsey.edu
President Patrick Johns
Phone: (763) 422-3435

Project Contact:

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Dean of Continuing Education
& Customized Training
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STATE COLLEGES
& UNIVERSITIES**

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The Minnesota State Colleges and Universities system is an Equal Opportunity employer and educator.

Minnesota Job Skills Partnership Grants

The Minnesota Job Skills Partnership grants are a tremendous opportunity for businesses and education institutions to partner and provide training to company employees and expand college capacity. Anoka-Ramsey Community College is a leader in the grant development and management process. Our approach is to help businesses explore a broad range of their workforce development needs – then capture these needs in a realistic, yet innovative training plan and compelling grant application.

The process has proven rewarding for our business partners and has resulted in ARCC's procuring over five million dollars to serve the needs of businesses in the Twin Cities region and East Central Minnesota. ARCC has one of the most experienced MJSP grant writers on staff. Our grant managers are seen as a true resource to our business partners.

For information on the Minnesota Job Skills Partnership and ARCC's grant development resources, please contact Jess Niebuhr at 763.422.3414 or jess.niebuhr@anokaramsey.edu.

1997 – 12/99	ARCC Coon Rapids Campus with Possis Medical, Inc. (Project closed 1999)	\$200,000
10/98 – 04/02	ARCC Coon Rapids Campus with The John Roberts Co. providing all levels of training in printing, print processes, and brand identity. (Project closed 2002)	\$205,160
07/99 – 2/04	ARCC Coon Rapids Campus with Mercy Hospital providing training in electronic documentation of health care records and basic computer use. (Project Closed 2004)	\$385,000
10/99 – 10/03	ARCC Coon Rapids Campus with Possis Medical, Inc. providing assistance in the transition from a research firm to a manufacturing firm. (Project Closed 2003)	\$305,827
05/00 – 2/04	ARCC Cambridge Campus with East Central Allied Health Consortium providing supervisory training targeted at reducing turnover and creating a more stable and rewarding work environment. (Project Closed 2004)	\$285,000
11/00 – 7/05	ARCC Coon Rapids Campus with Mercy and Unity Hospitals developing a new patient care plan and developing accessible education options for mid-career health professionals.	\$379,800
11/00 – 10/03	ARCC Coon Rapids with Data Sciences, International providing the resources to assist a company experiencing significant growth and transitioning from design, development and manufacture of medical device/monitoring equipment for animals to approaching the FDA for product approval in humans. (Project Closed 2003)	\$329,863
09/01 – 07/04	ARCC Coon Rapids with Boston Scientific SCIMED developing computer based training for medical device industry scientists, engineers and other professionals. (Project Closed 2004)	\$400,000
04/02 – 04/05	Minneapolis Speaker Company (MISCO) Project includes worker preparation courses and instruction on the basic concepts of loud speakers. Training on line assembly of speakers for various uses and installations. Additionally ARCC will provide instruction on world-class manufacturing and leadership. Includes training on computer aided testing for individuals who perform final product testing and training on the Robot XYZ assembly machine (MISCO's 1 st robotic assembly machine.)	\$189,515
04/02 – 04/05	American Medical Systems Develop web-based training on AMS products; pathology of incontinence, E.D., and obstructive relief urology. Project includes development of web based certificate programs for ARCC.	\$356,365
04/02 – 04/05	ADC Telecommunications Provide Cisco Network Associate, Network Professional	\$201,979

	and Design Professional training, plus, CD enhanced blended learning for customer service individuals needing familiarity with ADC products, services and processes.	
11/02 – 11/05	MedSource Technologies Brooklyn Park facility is undergoing significant change. ARCC will assist through training in many areas, including Swiss machining, laser welding, supervisory and management skills, quality, SPC, and other areas as needed.	\$240,000
6/03 – 6/06	OakRiver Technology is a medical device engineering solutions firm. Partnership includes extensive training on OakRiver Technology business processes, including Root Cause Analysis, Manufacturing Process Development, FDA requirements of Good Manufacturing Principles, Technical Engineering Processes and Product Development, Production, Workmanship Excellence, Supply Chain Management and Successful Business Culture.	\$242,126
6/03 – 6/06	3M Stillwater's partnership is designed to help 3M Stillwater respond to the ever increasing need for efficiency and lower production costs in the automotive industry. Training includes: production processes, preventative and corrective actions, quality standards and statistics and electronic databases and communication, plus "Green Belt Light", and introduction to Six Sigma Language.	\$315,345
6/03 – 6/06	E & O Tool & Plastics, Inc. is a full service original equipment Manufacturer (OEM). The partnership is designed to improve productivity processes, including training on Cell Technology, Lean Manufacturing, Theor Constraint and Making the Transition to a Lean Environment.	\$100,000
6/03 – 6/06	Training for CIMA LABS, Inc. a pharmaceutical company, includes operator training on five primary production processes, plus training on data collection, statistical processes, the drug development process, Train-the-Trainer and project management.	\$360,000
6/03 – 6/06	Synovis Interventional Solutions is a medical device manufacturing company. The partnership is designed to provide training for Synovis employees as the company grows rapidly and transitions to new product lines and begins to market products under the Synovis brand.	\$310,000
12/03 – 02/07	Transoma Medical (formerly DSI) is a world leader in manufacturing telemetric devices for implantation in research animals. The company has developed a product for long term implantation in humans to monitor congestive heart disease. The partnership includes a wide variety of training topics, including but not limited to: telemedicine, bioethics, FDA approval and compliance, US and European labeling requirements, understanding insurance reimbursement process, understanding the drug development process, and sleep studies.	\$378,222
6/04 – 6/07	Cambridge Medical Center and Grandview Christian Ministries ARCC will provide training to help improving processes and productivity at both facilities. Training will also be provided on lifting equipment and transitioning to "no-lift" environments, to reduce patient and employee injuries and worker's compensation insurance premiums. Part of the grant will be to create a lifting lab on the Cambridge Campus as a demonstration and training site for the partner facilities, the college, and perhaps other area health care providers.	\$399,846
10/04-10/05	Top Tool Company - ARCC will develop and provide training to company employees in a range of topics focused on process improvement, budgets and forecasting, statistical analysis and company specific procedures.	\$49,444
Total Grant Dollars		\$5,584,048



Biomedical Technology

Design Your Future

BIOMEDICAL TECHNOLOGY PROGRAMS

“...Minnesota’s medical technology industry is recognized worldwide for being at the forefront of innovation”¹

The Biomedical Technology Programs at Anoka-Ramsey Community College prepare students to work or advance in the medical device industry. Program graduates work in a variety of positions in this dynamic industry, depending upon their background and interests. Some become members of teams that develop or manufacture devices like implantable cardiac pacemakers, artificial heart valves or in-the-ear hearing aids. Others may be involved in clinical research to study the effectiveness and safety of such devices.

Anoka-Ramsey Community College has worked closely with partners in the medical device industry to create three unique Biomedical Technology Programs, designed to support industry growth. These industry partners have helped to develop and review program curricula to ensure that students have the education needed by the device industry. In addition, the programs provide professional challenges that entice creativity and satisfy students’ desire to improve the quality of life for others.

“In 2000, there were over 2,800 businesses in Minnesota in biotechnology and related industries, employing nearly 60,000 people....”²

PROGRAM HIGHLIGHTS:

- *Biomedical faculty are industry professionals who bring real industry experience to the classroom.*
- *Students can choose their own pace—starting with the technician certificate, building to the AS degree, and continuing on to complete a four-year baccalaureate program.*
- *An internship provides hands-on application of course material in an industry setting.*
- *Regional employers are recruiting our students and graduates.*
- *No other biomedical program of this type exists in the state of Minnesota.*

¹ MN Department of Employment and Economic Development, Industry Fact Sheet, BCD-00680, 2/04 - 500

² MN Department of Trade and Industry, Industry Fact Sheet, BCD-0068M, 2/03.

Educational Excellence Designed for Your Future

CAMBRIDGE CAMPUS

300 Polk Street South
Cambridge
Minnesota
55008

TELEPHONE:
763-689-7000

FACSIMILE:
763-689-7050

COON RAPIDS CAMPUS

11200 Mississippi Blvd. NW
Coon Rapids
Minnesota
55433

TELEPHONE:
763-427-2600

FACSIMILE:
763-422-3341

THREE PROGRAM OPTIONS:

BIOMEDICAL TECHNICIAN CERTIFICATE

33 CREDITS

This program prepares students for entry-level positions or for advancement in the biomedical device and product industry. The certificate program is designed to meet the needs of students who may have no prior background, as well as students with advanced degrees. Depending upon prior education and experience, graduates will work in a wide variety of positions in manufacturing, product development and testing. Starting salaries typically range from \$25,000–\$40,000.

Additionally, the certificate program provides the foundation for the A.S. degree program below, and many of the courses transfer to four-year institutions. Program Core Courses are offered in the evening. Most other courses are available in the evening or online.

Program Core Requirements	Credits:	12	Additional Requirements	Credits:	21
▪ Introduction to Biomedical Devices/Industry	2		▪ Medical Terminology	2	
▪ Design & Manufacturing in the Medical Device Industry	3		▪ The Human Body	4	
▪ Introduction to Medical Device Regulations/Ethics	3		▪ Human Relations in the Workplace	3	
▪ Field Experience & Seminar with a biomedical company	4		▪ Career Development	2	
			▪ College Writing & Critical Reading	4	
			▪ Introductory Statistics I	3	
			▪ Introduction to Speech Communication	3	

BIOMEDICAL TECHNOLOGIST ASSOCIATE IN SCIENCE

62 CREDITS

This degree program prepares students for entry-level positions in biomedical companies and for transfer to programs at various four-year universities. The 62-credit Associate in Science degree builds on the 33-credit Biomedical Technician Certificate, adding additional coursework in science and technology, problem-solving, critical analysis, oral and written communication, and interpersonal skills. “Hands-on” learning is a key component, including a field experience with a local biomedical company. Graduates typically start at salaries that range from \$28,000–\$40,000, depending upon prior experience.

CLINICAL RESEARCH PROFESSIONAL CERTIFICATE

24 CREDITS

This program is designed for students who have already completed an RN (AS, AD, BSN) degree or a bachelor’s degree in pharmacology, biology or related field, and plan to work in clinical research positions within biomedical or other health-related companies. Graduates will work in research monitoring, clinical research coordination, clinical data management, and regulatory affairs. Classes include 15 credits in specific biomedical coursework that include introduction to clinical research and a field experience with a biomedical company. The remaining nine credits are taken in microbiology, statistics, and pharmacology. Starting salaries range from \$35,000–\$55,000, depending upon prior experience.

Contact: Carole Fuller, Biomedical Programs Director, 763-576-4640 or carole.fuller@anokaramsey.edu

**This document can be made available in different formats upon request.
Please call 763-576-4640 or 1.800.627.3529 (TTY/TDD)**

Minnesota's

Bioscience Industry

A FACT SHEET FOR BUSINESSES

Agricultural and Industrial Biotechnology:

Minnesota is well positioned with abundant agricultural resources and top industrial biotechnology firms.

■ Minnesota's Agricultural and Industrial Biotechnology industries supply a diverse range of products that include:

- Agricultural chemicals (**Cargill Inc.**, **Cenex Harvest States**)
- Specialty cleaning and sanitation preparations (**Ecolab**)
- Sanitary products (**H.B. Fuller**)
- Prepared feed and feed ingredients (**Land O'Lakes Agricultural Services**, **Archer Daniels Midland**, **Cargill Inc.**)
- Crop services (**Land O'Lakes Agricultural Services**, **Syngenta Seeds**, **Cenex Harvest States**)
- Biofuels (**Cargill Dow LLC**, **Minnesota Corn Producers – ADM**)
- Biopesticides (**Syngenta**)
- Soybean processing (**ADM**, **Cenex Harvest States**, **Ag Processing Inc.**)
- Plant biopolymers/fibers (**Cargill Dow**)
- Industrial lubricants (**Cargill Inc.**)

■ **Cargill Dow LLC** manufactures biodegradable packaging and fibers using corn starch and a special fermentation process that requires 20 to 50 percent less fossil resources. CEO Randy Howard was named to the 2002 *Scientific American* 50, a list of visionary contributors to science and technology.

■ **Minnesota Corn Processors** is the second largest domestic producer of ethanol, and merged with Archer Daniels Midland in 2002.

■ **Land O'Lakes** provides farmers with:

- Genetically engineered seeds through its seed company **Croplan Genetics** that produce higher yields through crop inputs and agricultural services.
- Specialty corn products for animal feeds and consumer food markets developed in conjunction with **Novartis Seeds**.

■ Using a solvent process, **Cenex Harvest States** manufactures soy products including edible refined oil, ink, flour, soy meal, fatty acids and lecithin. In 2003, Cenex Harvest States opened its second soybean crushing facility in Fairmont, Minnesota.

■ **Ecolab** operates in 40 countries worldwide and manufactures products such as cleaners and hand sanitizers.

■ **H.B. Fuller** has developed water-based adhesives and non-woven hygienic technology used in the fabrication of diapers, adult incontinence devices, feminine and disposable medical products.

■ In 2003, **Minnesota Soybean Processors** built a new soybean processing plant in Brewster, Minnesota and announced the addition of a biodiesel refinery.

■ A project of Positively Minnesota, the Department of Agriculture and the University of Minnesota's Department of Wood and Paper Science, the **Minnesota Biofiber Consortium** brings together leaders of industry, research and agriculture to promote agricultural crops and residues as industrial feedstocks.

Top Agricultural and Industrial Biotechnology Companies in Minnesota

Company	Annual Sales* (millions)
Cargill	\$59,894
Cenex Harvest States Oilseed Processing	4,500
Ecolab	3,404
Land O'Lakes Agricultural Services	2,853
H. B. Fuller	1,256

* Sales for Minnesota headquarters or Minnesota-based operations
Source: Corporate Report Factbook 2003
Dun & Bradstreet, company annual reports.

■ In Minnesota there are:

- About 1,300 agricultural and food scientists and technicians, and 2,500 chemist and chemical technicians.
- About 375 chemistry and more than 200 chemical engineering degrees were awarded in Minnesota in 2000.

■ Minneapolis-St. Paul is considered the fifth most knowledge competitive region in the world, according Robert Huggins Associates, a British research firm. Rankings take into account indicators such as the number of IT, biotechnology and engineering employees per 1,000 inhabitants, and the number of patents registered per million people.

■ According to research done at the University of Minnesota in 2003, Minnesota farmers are producing **engineered seed crops** valued at \$2.2 billion annually.

■ Examples of **seed research** include wheat and potato fungal resistance at the University of Minnesota and sugar beet herbicide tolerance at BetaSeed of Shakopee, Minnesota.

*University of Minnesota:
Exceptional Chemistry, Agricultural and Veterinary Studies*

- The University's **College of Agricultural, Food and Environmental Science**, one of the top five colleges of agriculture in the world, enhances agricultural systems through plant genetics and biocontrol of weeds.
- Studies at the University's Colleges of **Veterinary Medicine and Molecular Veterinary Bioscience**, include genomics, molecular biology, and comparative medicine.
- The **Chemical Engineering** program is ranked number one by the National Research Council and each year confers about 210 graduate and undergraduate degrees.
- The \$20 million **Cargill Building for Microbial and Plant Genomics** provides a hub for 175 researchers in the genomics of microbes and crop plants. The building opened in 2003.

Medical Technology:

Biotechnology advances use applications developed by the medical technology industry, and Minnesota's medical technology industry is recognized worldwide for being at the forefront of innovation.

- Minnesota's medical technology industries supply a diverse range of products that include:
 - Cardiovascular technologies such as heart valves, pacemakers, defibrillators and stents (**Medtronic; St. Jude Medical; Guidant Corp; Boston Scientific, Inc.**).
 - Catheter technologies (**Medtronic; St. Jude Medical; Boston Scientific, Inc.; Deltec, Inc.**).
 - Drug delivery systems (**3M; Cima Labs, Inc.; Medtronic; Deltec, Inc.**).
 - Dialysis products (**Minntech**).
 - Impotence products (**American Medical Systems**).
 - Electrotherapy (**Medtronic; St. Jude Medical; Compex Technologies, Inc.; Empi Inc.**).
 - Spinal implants (**Sulzer Spine-Tech**).
 - Warming products for hypothermia (**Arizant, Inc.**).
 - Hearing aids (**Starkey Laboratories; Miracle Ear**).
 - Eyewear lenses (**BMC Industries; Soderberg Ophthalmic Services**).
 - Medical device contract manufacturing (**ev3, Inc.; Lake Region Manufacturing; Medsource Technologies; Surgical Technologies**).
 - Drug-eluting coating process for medical devices (**SurModics**).
 - Drug-coated stents (**Boston Scientific, Inc.; Guidant Corp; Medtronic (under development)**).

Top Medical Technology Manufacturers Operating in Minnesota

Company	Annual Sales* (millions)
Medtronic, Inc.	\$7,665
Guidant Corp.	3,240
3M – Health Care	2,560
Boston Scientific, Inc.	1,709
St. Jude Medical, Inc.	1,589

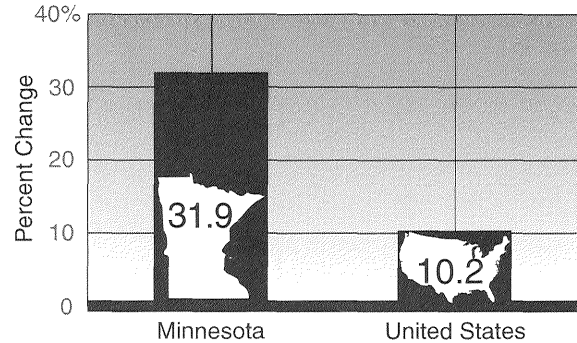
* Sales for Minnesota headquarters or Minnesota-based operations
Source: Corporate Report Factbook 2003
Dun & Bradstreet, company annual reports.

- There are more than 520 FDA approved medical device establishments currently in Minnesota.
- About 2,500 medical device related patents were registered to Minnesota companies between 1997 and 2001.
- According to the Milken Institute, Minnesota has the nation's highest number of investigational medical devices and FDA pre-market approvals of medical devices per 100,000 residents .

Outstanding opportunities for collaboration

- **Mayo Clinic:** world's best known health care facility also collaborates with health care and medical technology companies.
- **Industrial Partnership for Research in Interfacial and Materials Engineering (IPRIME):** Facilitates the use of University of Minnesota equipment and staff for its members, which include businesses such as Medtronic, SurModics, and 3M (www.iprime.umn.edu).
- The **University of Minnesota's Biomedical Engineering Institute** combines engineering and health sciences to create new medical devices.

Employment Growth in Medical Technology Industries*, 1992-2002



* SIC 384 and 385, NAICS 334510, 334517 and 339111-329115.

Source: U.S. Department of Labor, Bureau of Labor Statistics, Covered Employment and Wages (ES-202).

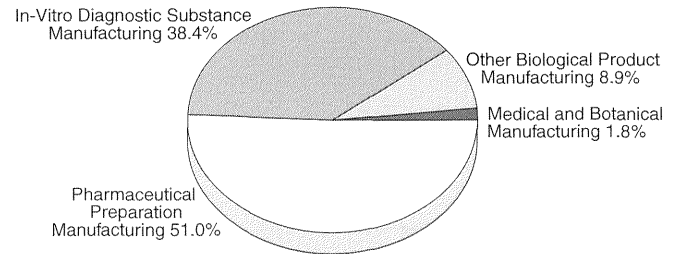
- Minnesota's medical technology industry employment:
 - Increased 31 percent between 1992 and 2002 to over 21,300 people.
 - Had a concentration of employment over three times the nation's.
 - Ranks second only to California in the medical device industry.
- A number of medical technology companies appeared on the prestigious 2003 Fast 500 prepared by Deloitte and Touche.
 - **Vascular Solutions, Inc.** revenues grew more than 2,300 percent and **Endocardial Solutions Inc.** more than 1,200 percent over five years.
 - **Possis Medical** revenues grew almost 600 percent over five years.
 - **Synovis Life Technologies** was among *Fortune* magazine's 100 Fastest-Growing Companies for 2003.
- Minnesota companies and research institutions have been first in developing many important medical devices:
 - Implantable cardiac pacemaker.
 - Artificial heart valves.
 - Implantable drug transfusion pump.
 - Anesthesia monitor.
 - Blood pumps.
 - Artificial urinary sphincter.
 - In-the-ear hearing aid.
 - Wireless cardiac monitoring system.
- Minnesota medical technology companies have been involved in numerous mergers and acquisitions.
 - **Medtronic, Inc.** announced the acquisition of four companies in 2002, including California-based MiniMed and Medical Research Group, Inc. (MRG). Medtronic made acquisitions totaling nearly \$13.9 billion between 1996 and 2002.
 - Since 2002, **ev3, Inc.** has acquired Appriva Medical, Inc. of California and Minnesota's Intra Therapeutics.
 - **Medsource Technologies** acquired Cycam, Inc. of Pennsylvania, while **American Medical Systems** acquired California-based CryoGen, Inc. in 2002.

Pharmaceuticals:

Minnesota's pharmaceutical industry is vibrant and fast growing.

- Minnesota's pharmaceutical industry supplies a diverse range of products that include:
 - Cardiology (**Upsher-Smith, 3M, Solvay Pharmaceuticals**)
 - Oncology-related pharmaceuticals (**MGI Pharma**)
 - Dermatology (**Upsher-Smith, 3M**)
 - Gastroenterology, mental health (**Solvay Pharmaceuticals**)
 - Immune system enhancing compounds (**Biopolymer Engineering Inc**)
 - Women's health (**3M, Solvay Pharmaceuticals**)
 - Orally disintegrating dosage forms and contract pharmaceutical manufacturing (**CIMA LABS**)
 - Bioequivalent generic pharmaceuticals (**Paddock Laboratories, Upsher-Smith**)
 - Animal health drugs (**Intervet, Newport Laboratories**)

Minnesota Employment in the Pharmaceuticals Industry*, 2002



* NAICS 3254

Source: U.S. Department of Labor, Bureau of Labor Statistics, Covered Employment and Wages (ES-202).

Top Pharmaceutical Manufacturers Operating in Minnesota

Company	Annual Sales* (millions)
3M Pharmaceuticals Inc.	\$1,000
Biopolymer Engineering Inc.	650
Solvay Pharmaceuticals Inc.	450
Upsher-Smith Laboratories	177
CIMA LABS Inc.	77

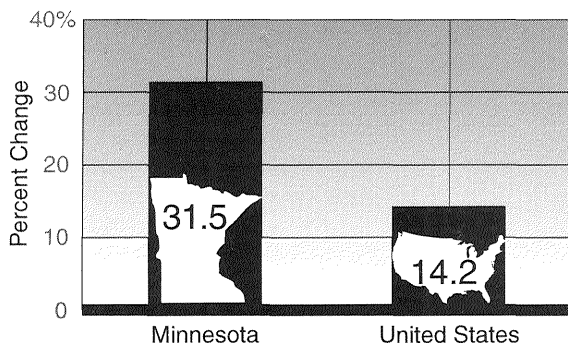
* Sales for Minnesota headquarters or Minnesota-based operations

Source: Corporate Report Factbook 2003

Dun & Bradstreet, company annual reports.

- Minnesota is home to about 9,800 pharmacists and pharmacy technicians, as well as 2,500 chemists and chemical technicians.
- Twenty-nine Minnesota establishments have prescription and over-the-counter drugs currently listed with the FDA.
- Between 1997 and 2001, Minnesota companies registered more than 300 drug patents.

Employment Growth in the Pharmaceuticals Industry*, 1992-2002



* SIC 283, NAICS 3254

Source: U.S. Department of Labor, Bureau of Labor Statistics, Covered Employment and Wages (ES-202).

- Minnesota enjoys an excellent quality of life:
 - First for a record seven years in a row: Minnesota rated "the Most Livable State" by Morgan Quitno Press.
 - Minnesota was first in the nation for children's well-being according to the 2003 Kids Count Databook.
 - Home ownership rate was tied for first in the country in 2002.

- Pharmaceutical companies operating in Minnesota are among the best in the nation.
 - In 2003, **3M** was listed among the top 50 pharmaceutical companies by *Pharmaceutical Executive*, while **Upsher-Smith** was named one of the top 100 largest pharmaceutical companies in 2001. **Solvay Pharmaceuticals**, another top 50 pharmaceutical company, has a significant manufacturing facility in Baudette, MN.
 - **CIMA LABS, Inc.** appeared on the prestigious 2003 Fast 500 prepared by Deloitte and Touche with growth of more than 500 percent over five years, and was listed as one of *Fortune* magazine's 100 Fastest-Growing companies in 2003
 - **Biopolymer Engineering, Inc.** engineers natural carbohydrates to enhance immune health. The company has acquired more than 200 U.S. and international patents.
 - Scientists at **3M Pharmaceuticals** research laboratories in St. Paul developed synthetic molecules called Immune Response Modifiers (IRMs) that have potential applications for treating viruses and tumors.

<i>Excellent research and educational institutions</i>	<ul style="list-style-type: none"> ➤ The University of Minnesota's College of Pharmacy has programs in the Twin Cities and Duluth, and confers degrees on more than 100 students each year in its professional program, while about 375 chemistry degrees and almost 1,400 biological and life sciences degrees were awarded in Minnesota in 2000.
<i>Vanguard in Research</i>	<ul style="list-style-type: none"> ➤ Nanocopeia, Inc., a startup company utilizing research developed by U of M professor David Pui and his colleagues, creates nanotechnology devices for drug formulation, gene therapy and tissue regeneration. ➤ One of <i>U.S. News and World Report's</i> 10 leading innovators for 2001, Dr. Catherine Verfaillie is the director of the Stem Cell Institute at the University of Minnesota.
<i>Educated and motivated workforce:</i>	<ul style="list-style-type: none"> ➤ Minnesota's labor force participation rate of 75.7 percent was highest in the country in 2002. ➤ Ninth highest percent of population holding bachelors degrees among the states. ➤ Tied for second in the percentage of residents who are high school graduates or higher in 2000.

Human Health Microbiology:

Minnesota companies shine in the diverse human health microbiology field.

■ Minnesota's human health microbiology industry supplies a diverse range of products that include:

- Contract R&D laboratories (**ATG Laboratories, ViroMed, Apptec Laboratory Services**)
- Cell culture products (**ViroMed, Apptec Laboratory Services**)
- Immunoassay testing (**Beckman Coulter**)
- Cytokine-related reagents (**R&D Systems**)
- Hematology controls and calibrators (**R&D Systems**)
- Immunoassay and conjugate stabilizers (**SurModics**)
- cGMP manufacturing services (**Apptec Laboratory Services**)
- Occupational health testing (**Medtox Scientific Inc.**)

■ **Minnesota Partnership for Biotechnology and Medical Genomics:**

A Minnesota initiative leveraging the scientific leadership of the University of Minnesota and the Mayo Clinic into a powerful research collaboration to position Minnesota as a world leader in biotechnology and medical genomics. (www.mayouminnesotapartnership.org)

■ About 1,500 biological and life sciences degrees were awarded in Minnesota in 2000.

■ Minnesota is home to about 1,300 biological scientists and technicians, as well as more than 2,800 life scientists and other science technicians.

■ Firms in Minnesota are exploring new advances in microbiology:

- **R&D Systems-Techne Corp.** manufactures purified cytokines (proteins), antibodies, and assay kits as well as whole-blood hematology controls and calibrators. The company has been listed among the Top 25 Medical Technology Companies as of 2003 by *The Business Journal*.
- **Beckman Coulter Inc.** manufactures in vitro immunodiagnostic systems for allergies, infectious diseases, immunology, hormones, and serum proteins.
- **Protein Design Labs, Inc.** has antibodies in clinical development for autoimmune and inflammatory conditions, asthma and cancer.

Top Human Health Microbiology Companies in Minnesota

Company	Annual Sales* (millions)
R&D Systems – Techne Corp.	\$145
Protein Design Labs, Inc.	80
Medtox Scientific Inc.	52
Viomed Laboratories – LabCorp	25
Apptec Laboratory Services	16

* Sales for Minnesota headquarters or Minnesota-based operations
Source: Corporate Report Factbook 2003
Dun & Bradstreet, company annual reports.

Exceptional Biological Research Facilities

- The University of Minnesota provides state-of-the-art imaging and advanced genetic analysis facilities to companies through the "Biotech Mall" known as "Biodale".
- Between 1998 and 2002, more than \$300 million was invested in genomics and biotechnology at the University of Minnesota.
- The University of Minnesota has the Biotechnology Institute, Developmental Biology Center, Biomedical Engineering Institute, and the Biomedical Genomic Center. The Mayo Clinic has the Genomics Research Center.

Bioscience Industry Assistance:

■ Minnesota's 2003 Legislature created the **Bioscience Zone**. The zone, which will have two sub-zones located near the University of Minnesota and the Mayo Clinic, will provide tax incentives to existing and start-up bioscience companies (www.mnpro.com).

■ The **Minnesota Bioscience Council** makes recommendations to the Governor and Legislature on economic development initiatives aimed at supporting the growth of Minnesota's bioscience industry. The Bioscience Council is made up of bioscience industry leaders, University of Minnesota and Mayo Clinic officials, venture capitalists, and legislators, and is staffed by the Department of Employment and Economic Development (www.positivelyminnesota.com).

■ **Bioscience associations** include MNBIO (www.minnesotabiotech.org), the Society for Biomaterials (www.biomaterials.org), Medical Alley (www.medicalalley.org), and Minnesota Technology (www.minnesotatechnology.org).

positively
Minnesota

Department of Employment and Economic Development

500 Metro Square, 121 7th Place East
Saint Paul, Minnesota 55101-2146 USA

Bioscience Industry Specialist:
Gene Goddard
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TTY/TDD: 651-282-6142
Fax: 651-296-1290
www.deed.state.mn.us

Sample Six Year Plan Printout



ADAMS, LAURALYN M 264871

Proposed High School Class Schedule

Enter the courses you plan on taking in grades 9 through 12 in the boxes below. Review your choices with your parents, advisor and counselor to make sure you are taking the proper sequence of courses to prepare you for your career goals.

This component should be completed in grade 9 and then updated at least once per year.

- 9th Grade**
 Updated on 08/31/2004
 English 9
 Civics
 Phy Ed
 Algebra 1 or Integrated Math
 Ethnic Cooking
 Computer Literacy
 Physical Science
 Elective of my choice

- 10th Grade**
 Updated on 08/31/2004
 English 10 IB
 World History 1
 Health
 Spanish 2
 Biology
 Geometry
 Ceramics and Sculpture
 Elective of my choice
 Elective of my choice

- 11th Grade**
 Updated on 08/31/2004
 Woodworking
 English 11
 Algebra 2 with Trig
 Chemistry
 Spanish 3
 American History
 Ceramics & Sculpture, Adv
 Elective
 Post Secondary Options Class
 Accounting

- 12th Grade**
 Updated on 12/04/2003
 English 12
 Physics
 Analysis or Pre Calculus
 World History
 Spanish 4
 Woodworking, Advanced
 Continue Post-secondary Options
 Elective
 Elective

When entering courses students might want to use the course numbers as well so they can use this screen when they register for classes online.

What I want most from school this year is?.....

09/08/2004	To make 3 good friends that I can hang out with and talk to.
08/26/2004	School will be out for the summer soon. I can't wait. I started to look at all the stuff I wrote and some of it is pretty corny but I have to say that this is the first time anyone has made me think about what I want in school. My friends and I don't normally talk about our futures except for what's happening this weekend. So, as much as I complained about doing this....it was a good idea. I need to start planning next year.
04/12/2004	Meet at least three advisors to determine what activities I want to join.
04/02/2004	To pass all my classes
04/02/2004	Meet some girls
03/17/2004	I want to take a class on health.
01/26/2004	Make the basketball team
01/02/2004	I suppose you want me to give a serious answer. Seriously, I don't know, but am willing to talk about it with someone. Maybe they can help me.
12/05/2003	I want to be on the A honor roll both semesters this year.
12/04/2003	To find out what I need to do to go to college.
12/04/2003	High school is really different than junior high school. I don't know who will be reading this but I hope that whomever it is will learn a little bit more about me. I am a pretty cool person but I need more direction.

My favorite subject is?.....because?.....

09/08/2004	Chemistry has been my favorite class. I like learning about atoms and what all those big words on the food package mean.
05/11/2004	Tengo Espanol el primero period en me escuela y es muy bueno. I hope my teacher doesn't see this. I think some of it might be wrong. At least I tried.
04/02/2004	I'm not sure yet
04/02/2004	Science because, I get to talk all the period
12/19/2003	My favorite subject is math,because il always liked to work with numbers
12/12/2003	Hola. Me llamo es Lauralyn. Spanish 1 has taught me a bunch of new words that I have tried using with my Spanish speaking friends. They laugh at me a little but that's OK, I'm just learning.
09/01/2003	I'm not really sure yet. Think I will wait to see what my teachers are like. I was pretty good in math and science last year.

My Dream Career is...

09/08/2004	Becoming a nurse is something I still think about a lot but the job market is kinda full of
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nurses so i am thinking about other medical fields like dental assistant, majoring in biology or maybe even chemistry
05/11/2004 Right now I am only a 9th grader and things will probably change. I have thought about becoming a registered nurse or maybe a nursing assistant. I like to help people. Did you know what you wanted to do at my age? See, it's not so easy is it? I need more help!
04/02/2004 You know, a lot of my friends and classmates have no clue as to what they want to do. I thought this 6 Year Plan website would be boring but it is forcing me to think more about my future and that's good.
12/29/2003 Good question. I have no idea right now. Help me!
12/19/2003 I have a lot of dreams. The hard part is connecting them with a career. I know I need to think about this stuff but I would rather spend time having fun. I am glad you are asking me these questions...it makes me think.
12/19/2003 Go to the NFL and be a full back for the Raiders.
12/19/2003 My dream career is to be a famous basketball or football player or a physician.
06/06/2003 I went to St. Paul College this spring with my school and I really think nursing is something I want to do. The field trip really helped me think about it. School should do more of those things.



ADAMS, LAURALYN M 264871

About Me

Enter and edit information about yourself below.

This component should be completed in grade 9 and updated at least once per year.

Five words that would describe me right now are...

09/08/2004 Looking at all of the things I have written I would choose these five words from all of them: Respectful, Sincere, Caring, Motivated and still a little bit overwhelmed.
05/11/2004 Summer is jsut around the corner and I made it through 9th grade. I actually earned all 12 of my credits this year. So the 5 words that describe me right now are happy, happy, happy, happy, happy.
01/02/2004 Happy New Year to all of you reading "About Me".
12/19/2003 Lovable, intellegent, respectful, nice, and understanding
12/19/2003 smart,funny,outgoing,hardworking,responsible
12/18/2003
12/04/2003 A liittle bit bored, a little bit overwhelmed but basically happy.
11/17/2003 Happy, Friendly, Responsible, Pretty, Smart! I love computers. Word Up!!
11/14/2003 Friendly, hardworkikng, athletic, honest and motivated, bcause if I am not my dad will kill me
11/14/2003 My high school is the best high school in Saint Paul!
11/14/2003 Wow, I am really getting a lot out of my advisory!
06/06/2003 I haven't changed much in a month. I just wanted to say that I am excited about summer and not having homework to do.
05/05/2003 I changed my mind. Here are my new words to describe me: Happy, Hardworking, Responsible, Caring, Smart!

My Strengths are...

09/08/2004 I have been a good student in most classes and do the work assigned. I am motivated most of the time and realize that if I don't work hard and do well in high school then I may not be able to live the way I want to after I school. So I guess I am pretty well grounded for someone my age.....is that a bad thing?
12/19/2003 caring, listening, playin football, and ssolving problems
12/19/2003 sports
12/18/2003 reading

I need to improve...

12/04/2003	I am a good writer and speaker. I play basketball and will be on the track team this spring. I volunteer at my church
12/04/2003	I love to play tennis!
09/08/2004	This Six Year Plan thing has got me thinking that I need to focus on my future more. I have one more year left after this one and what am I going to do. So many possibilities.
12/19/2003	working abilities
12/19/2003	My attitude, overconfident, I get mad really easily, bad tempered, mostly my attitude.
12/18/2003	studys habits
12/04/2003	I do not always use my time wisely and I spend too much time watching TV and talking on the phone
12/04/2003	My study habits and I need to pass the Basic Skills Math Test yet

My plans to make these improvements are...

09/08/2004	I am going to take more time this year talking to people and researching some of the careers I have been thinking about
05/11/2004	It's almost time to make New Year's resolutions. This year I plan to spend less time screwing around and wasting my time and more on what really matters to get me where I want to be in the future. Look out for me this year!
	Hey mom!, did you read this?
12/19/2003	work harder and do my best
11/14/2003	I plan to take more math especially a math class to improve my BST math core. I will use my school planner to keep track of my homework I will not watch TV until I have completed at least 50% of my homework. After 1 hour I will complete the other half.
08/13/2003	I plan to take the BST Math class that my school is offering and will use my high school planner this year for more than just a place to put phone numbers

What I like to do when I'm not in school. (Hobbies, sports, clubs, extracurricular activities.)

09/08/2004	Sometimes I think I waste too much time but then I don't have to be doing something all the time right. I am looking forward to playing tennis at school this year and continue my job at Mac D's.
12/19/2003	spend time with my family, go to church, and play sports
12/19/2003	sing, smoke, talk to girl, sleep, watch t.v., play video games, spend time with my family, and write in my journal.
12/18/2003	play video games, read, do things
12/04/2003	I have found a part time job at McDonalds. Not something I love to do but gives me some extra spending money and reminds me that I can do a lot better than this after I graduate.
05/22/2003	I have 2 brothers and 2 sisters who are younger than me and with my mom working till 6 pm most days a lot of my time is spent with them. I learn a lot about being responsible from them. It's hard to be patient all the time but I try. When I do have time for myself I like to talk to my friends, hang out, shop, read books, and go for walks.

If I could have just one wish granted, I would wish for?because?.....

09/08/2004	I would wish that my parents would stop fighting all the time
05/20/2004	
05/11/2004	This is a sample Six Year Plan and lots of people can enter stuff in it. If you are one of them write something cool and find out how to create your own plan from your counselor or advisor. Only you can write stuff in your plan!
12/19/2003	I would wish for a cure for every disease.
12/19/2003	To see my dad cuz I can't remeber what he looks like. To see him in person agian. Cuz I have so much to ask him.
12/04/2003	I could put something really stupid here like wishing to win the lottery. Realisticly I would just like for my grandpa to get better. He is really sick right now and may not be around for much longer unless he imporves. If you are reading this then think a positive thought for him.

Of all the people I know, the one person I admire the most is?.....because?.....

09/08/2004	That's a hard one. I know and admire a bunch of people but to pick just one of them is hard. I guess it would be my mom. She is pretty cool most of the time.
12/19/2003	My grandma because she is the person who looks out for me and I love her very much.
09/18/2003	That would be my mother. She has always been there for me and devoted her life to raising her family even if it meant many personal sacrifices.

If I could live any place in the

01/02/2004	I went to New York over vacation and I can see myself living there..at least until i am 30.
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world I would choose?.....because?.....

12/19/2003	I would live in California because it is hot all year round.
12/18/2003	washington,the state
12/04/2003	I would choose a place that is close to my family and friends. The climate is not as important as being around the people I care about. About now someplace warm sounds really good.

Awards, Honors, and Activities

12/19/2003	I filled out an application at McDonalds and they interviewed me. I must have done OK cause they hired me.
05/22/2003	I have been on the B Honor roll twice since 9th grade. I received a SOAR Award last year from my science teacher. I read more than 25 books last year. I am involved with the youth program at my church and my brother and sisters and I still get along OK.

Questions that I need Answers to....

09/08/2004	How many people are in the world?
05/20/2004	How many licks does it takes to make it to the middle of the tootsie pop?
05/11/2004	I need a job this summer. Anyone out there looking for a good worker?
03/30/2004	I want to get more involved with things at school that happen during the school day since my time after school is spent babysitting my brothers and sisters. I am also interested in the PSEO Program for next year. What do I need to do?
12/19/2003	What are the St.Paul Hawks
12/04/2003	I forgot to ask. When can I take the PSAT?
08/26/2003	What is an Arlington Phoenix? Why are school lunches so.....?

Obstacles that have gotten in my way

09/08/2004	My biggest obstacle is myself. There are so many things to worry about. Is that an obstacle or does it have to be something really bad?
------------	---

If I could do anything, what would I do to make the world a better place?

09/08/2004	Wow! This is a tough question but I think a good place to start would be for everyone who wanted to work and make something of their life that there would be a job for them...a decent job.
------------	--

I am proudest of...

09/08/2004	That I feel pretty comfortable with myself as I get older. I still have a ways to go but I am not so caught up in having to please so many other people. I mean, I'm not old really but I'm not in junior high anymore. I've grown up a little.
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What would others say about me

09/08/2004	That's a good question. I should ask some of my friends and then I will write some thing.
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Courses and Credits Required for High School Graduation

Enter the credits for courses you have completed.

This section is for student course management and is not the official school record. Students should verify their credit analysis with a counselor as needed.

This area should be updated at least once per year.

Unofficial Student Record of Courses and Required Credits for Default (No high school enrollment found)

Subject	Required Credits	Credits Completed	Credits Still Needed	Last Updated
English 9	2	2	0	08/31/2004
English 10	2	2	0	09/08/2004
English 11	2		2	
English 12	2		2	06/05/2003
Social Studies	6	4	2	09/08/2004
Mathematics	5	4	1	09/08/2004
Science	4	4	0	09/08/2004
Physical Education	2	2	0	06/06/2003
Health	1	1	0	09/08/2004
Fine Arts	1	1	0	09/09/2003
Electives	21	6	15	09/08/2004
Credit Totals	48	26	22	

I am currently on track for graduation. (Yes, No, or I don't know.)

09/08/2004	I have 26 credits completed as of right now and I plan to graduate in June of 2006...on time.
05/11/2004	Yes
11/14/2003	I don't know
11/14/2003	Yes
05/30/2003	No

If your answer above is ?No? what courses do you need to make up and when will you make them up?

11/14/2003	I plan to go to summer school for English 9 this summer I wonder if the light in the fridge goes off when I close it. What doesn't kill me will only prevent the inevitable
------------	---

If your answer above is I don't now have you made an appointment with your counselor to review graduation requirements?

05/11/2004	Appointment made for 5/24/03. I know what the requirements are now and that will help. I thought someone else kept track of that but I guess I should be doing it too.
------------	--



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My Test Results and Scheduled Tests

This component should be updated once per year.

BST Reading

08/16/2004	Needs to take again
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BST Math

08/16/2004	Passed
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BST Writing

08/16/2004	Passed
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PLAN Test Results

04/02/2004	In the "TESTS" section you can record all of your test results and even list the tests you need to take and when you should take them. You can type as much information as you need.
04/28/2003	English 21 Math 20 Reading 20 Science Reasoning 17 Composite 20

ACT Test Results

04/28/2003	English 25 Math 29 Reading 27 Science Reasoning 23 Composite 26
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04/28/2003	English 25 Math 29 Reading 27 Science Reasoning 23 Composite 20
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PSAT Test Results

12/29/2003	Verbal 59 Math 61 Selection Index 179
12/29/2003	Sorry, I have nothing to say. I clicked in the wrong area and I can't delete.

SAT Test Results

12/29/2003	Verbal 610 and Math 630. I made it over 1200...whoopee!
11/25/2003	

Additional Tests - List test name and results

11/25/2003	On the Myers Briggs I am an ESTJ
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I still need to take the following tests to graduate.

04/02/2004	I only have the writing test to do now. The rest are over with.
08/04/2003	I passed the math this summer

I need to take the following tests to complete my plan for the future. Remove the tests not needed and add any additional tests.

11/25/2003	PLAN (10th grade) ACT (Take at end of my junior year) SAT (Take at end of my junior year) Re-take tests in fall of 12th grae if scores are too low
04/07/2003	The June 14, 2003 ACT test will be given at Harding and I have registered for it.

Career Assessment Inventory (CAI) General Theme Scales
Enter the three highest scores R, I, A, S, E C

12/08/2003	A E S (This is the result from the Career Interests Game I completed at: http://career.missouri.edu/holland/)
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Career Assessment Inventory (CAI) Basic Interest Areas
Enter the three highest Interest Areas

04/02/2004	Creative Arts, Law/Politics, Medical Service
------------	--

Career Assessment Inventory (CAI) Occupational Scales
Enter the three highest occupation names

04/02/2004	Painter, Pharmacist, Elected Public Official
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Post High School Plans

Enter and edit information about your post secondary plans below.

This component should be started in grade 9 and added to each year until complete prior to graduation.



Which one most accurately describes your plans for after high school at this time.

08/24/2004	Peace Corps
07/09/2004	Military
03/22/2004	Military
02/12/2004	Full time work
12/29/2003	2 year college or technical college
12/19/2003	4 year college or university
12/04/2003	I have no plans right now

In 5 years I plan to be... I plan to do... I plan to have...

07/20/2004	Can't that wait until I get out of high school? Did you know what you wanted to do after high school when you were in 9th grade? Probably not. It's a hard question to answer but I don't mind thinking about it. Will we be doing more with this six year plan thing next year?
04/02/2004	I have a hard time thinking about what I am going to do this weekend and you want me to tell you about 5 years from now. Don't think so, but it would be nice to think about. Can't we do something like this in class or in advisory?
12/05/2003	Help, I do not know what I want to do!
05/22/2003	I am thinking about going to Iowa State University and majoring in Mechanical Engineering
04/07/2003	I will be a sophomore in college somewhere in the midwest

In 10 years I plan to be... I plan to do... I plan to have...

09/08/2004	I read what I wrote on 6/6/2003 and it sounds pretty corny. I still think I will be out of college and doing something scientific like with biology or chemistry.
06/06/2003	I will be graduated from college and working. I will have my own place and support myself. I may be married but not thinking about it that much. I need to take care of me before I can get into a relationship with someone else.
06/06/2003	I plan to still be working in a science related career and will be enjoying my job. I will have a newer car in the garage of my townhouse. A really cool looking car like a Mustang Cobra. I will have a steady boyfriend, be involved with the community in which I live in a meaningful way and will do something really special for my parents in appreciation for everything they have done for me and I am just now realizing.
06/06/2003	I can't work all the time so I think I need to do some traveling. I have never been to California or Disneyland or outside of the U.S. So in ten years I will be able to say that I have done these things and more. I might also be back in graduate school.

My Dream Career is...

09/08/2004	Becoming a nurse is something I still think about a lot but the job market is kinda full of nurses so i am thinking about other medical fields like dental assistant, majoring in biology or maybe even chemistry
05/11/2004	Right now I am only a 9th grader and things will probably change. I have thought about becoming a registered nurse or maybe a nursing assistant. I like to help people. Did you know what you wanted to do at my age? See, it's not so easy is it? I need more help!
04/02/2004	You know, a lot of my friends and classmates have no clue as to what they want to do. I thought this 6 Year Plan website would be boring but it is forcing me to think more about my future and that's good.
12/29/2003	Good question. I have no idea right now. Help me!
12/19/2003	I have a lot of dreams. The hard part is connecting them with a career. I know I need to think about this stuff but I would rather spend time having fun. I am glad you are asking me these questions...it makes me think.
12/19/2003	Go to the NFL and be a full back for the Raiders.
12/19/2003	My dream career is to be a famous basketball or football player or a physician.
06/06/2003	I went to St. Paul College this spring with my school and I really think nursing is something I want to do. The field trip really helped me think about it. School should do more of those things.

Write a paragraph about your first day of work at your dream career.

09/08/2004	To lay on the beach and surf! Does this qualify as a paragraph? Probably not.
09/09/2003	I will be very nervous when I start my new job as a mechanical engineer with the 3M company. I start a month after I graduate from Iowa State which will give me some time to move and find a place to live. I imagine my first day will be spent learning the ropes and meeting the people I will be working with. It will be exciting to actually put what I have learned in college to use and start making some cash. The first day I expect will go very fast. Should I bring a lunch with me? Should I dress

casually or more formally. I will find out in time but it is exciting just thinking about a new chapter in my life. When I was in high school I often thought about going into a science related career and here I am in my first day on the job.

Other careers I am thinking about are...

09/08/2004 You can cut and paste careers form the tools side of this website right onto this page. Pretty easy to do. Here are a few cut and pastes I have done.
 Advertising and Promotions Managers
 Art Directors
 Cartoonists
 Creative Writers
 Directors- Stage, Motion Pictures, Television, and Radio
 Fashion Designers
 Film and Video Editors
 Graphic Designers
 Interior Designers
 Music Arrangers and Orchestrators
 Musicians, Instrumental
 Producers
 Singers

03/31/2004 These are some of the careers I got from the interest inventory I did on the Career Zone at:<http://www.nycareerzone.org/graphic/index.jsp>. It is part of this website and is prety cool and it's free.
 Garden Landscaper, Concrete Mason, Animal Caretaker
 Roofer,Nursery / Greenhouse Grower
 Auto Detailer,Housekeeper,Stock Clerk,Airport Ground Crew
 Mathematician,Aquaculturist, Animal Trainer
 Forester,Commercial Diver,Ironworker
 Elementary School Teacher
 Automobile Assembler,Bricklayer / Stonemason

12/08/2003 According to the Career Interests Game I did last week I should enjoy being an English teacher or possibly a photographer or a dental assistant. I plan to look into these a little further using the resources on this site.

12/04/2003 I used the Career Cruising Program on this website last week and it helped me to identify some other jobs I plan to look at. The program suggested I explore jobs as an arhitech, a civil enginee and even a fashion designer. I plan to look them up next time I update my plan.

05/22/2003 Lately I have been enjoying my physics class a lot and may want to go into a related field like engineering.

04/07/2003 I have also thought about becoming a veteranarian or a pharmacist

Explore at least three of the careers you are considering. This could include the following resources: internet searches, job shadowing, and interviews with people in this career, books, and internships. Summarize what you learned.

09/08/2004 Career #4
 What I learned about this career
 You have to research at least 3 careers but you can do more if you want.

09/08/2004 Career #1 (Type the title of the career/job you are researching here)
 What I learned about this career
 This is where you would write about the first career you are seriously researching and what you found out about it.

09/07/2004 Career #2
 What I learned about this career

09/07/2004 Career #3
 What I learned about this career

08/17/2004 Career Title Burger Flipper
 What I learned about this career
 It doesn't pay too well.

04/08/2004 I am interested in being a veterinarian so I spent a day following the doctor and the vet clinic in my neighborhood. The name of the clinic is the Maplewood Veterinary Clinic. I learned that it takes a long time to become a vet and that I need to take more science, get my grades up and keep working hard and take classes that will help me become a vet. When you are responsible for someone's pet you need to know what you are doing. I want to be a vet more than ever now and am willing to put in the time and effort it takes.

04/08/2004 My interest inventory said that I might be happy being a commercial truck driver so I spent a long weekend with my Uncle John who drives his own truck for a living. It was cool spening time with him but I don't think I want to be a Truck Driver anymore. You are by yourself too much, you might have to change jobs often, you are not home very much and it's not for me. I am glad I had the chance to see what it is really like to be a truck driver.

Use the web, your school's Career Resource Center or another source to research 3 higher education institutions you could see yourself attending. Complete the information for 3 institutions.

Name of Institution?
 Degrees/Programs I am interested in?
 Location of school?
 Type of School?
 Size of School?
 What do you need to do to get admitted?
 Tuition?
 Other information I learned about the school that will be helpful?

09/08/2004 Name of Institution? Type in the answers to all of these questions for each school you are researching. A scroll bar on the right appears when you edit or add new records and lets you move up and down. Use the Add Record for each school or you can Edit what you have already typed. Remember to always click the Submit button to the left when you are finished.

Degrees/Programs I am interested in?
 Location of school?
 Type of School?
 Size of School?
 What do you need to do to get admitted?
 Tuition?
 Other information I learned about the school that will be helpful?

08/24/2004

08/17/2004 Name of Institution?
 Degrees/Programs I am interested in?
 Location of school?
 Type of School?
 Size of School?
 What do you need to do to get admitted?
 Tuition?
 Other information I learned about the school that will be helpful?

List the steps you need to take during high school to reach your goals. Include courses, activities, tests and other items you need to complete.

09/08/2004 I need to take the ACT this spring and make a couple of college visits this summer too. I also want to get into Admission Possible this year. My classes are pretty well planned for this year and next so i am pretty happy with my game plan so far. This Six Year Plan takes time to do and I don't always take time to update it but it does help me plan and that is soemthing I just have to do.

04/02/2004 I need to spend more time researching what Nurses do, how much they make, how much training is needed, where to get it and lots of other stuff. I always thought nursing would be cool but how do I know if that is what I really want..what if I don't like it. I shoud use that Career Cruising site or Career Zone or one of those others sites my counselor told me about in the tools section of this website. It's scary having to think about your future but if I don't who will?

05/22/2003 I got an A in Physics last quarter and Mr. Smith thinks I might enjoy going into a science related field. I have applied to get into the 3M STEP program and plan to visit with college reps from some of the schools that have good science programs.

04/07/2003 I need to take more science to prepare myself for a career in nursing. I also need to find out which schools in Minnesota offer nursing program. I should look at that MCIS website that my counselor has told me about

List the steps you need to take after high school to reach your goals. Include education needed, degrees, licences or certifications needed.

09/08/2004 First, I need to visit some campuses this summer. Then I need to sort out a few things like waht i really want to major in and all that stuff. I should be able to answer this question better a little later. right now I don't have specifics...sorry.

05/11/2004 It's only the end of 9th grade but I have all my BST's passed and I have my courses picked for next year. Hey, it's a start. I got lots more to do I know.

04/02/2004 Right now it is too early to tell but I am definitiely going on to a 4 year college somewhere and will use high school to get ready for that.

04/14/2003 I visited St. Paul College with the MEP Program this fall and they have a good 2 year nursing program. That's all I am thinking about right now.

04/14/2003 I need to take the ACT this June in case I decide to go to a 4 year college.



ADAMS, LAURALYN M 264871

Resume and Efolio

If you have set up an "efolio" website or other website to display your work or resume you can record the web address below. If the site requires a username and password you want to make available to your counselor or advisor you can enter them below.

Web address of my efolio website or other websites I have created. The web address should include the full address including the http:// at the beginning.

08/16/2004	http://connect.spps.org
06/03/2003	

Username for Read Only Access...

No Records Found

Password for Read Only Access...

No Records Found



ADAMS, LAURALYN M	264871
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Check off Page

Use this page to check off the items you have completed as part of your Six Your Plan

1. Components of the Six Year Plan

Class Schedule

09/03/2004	Completed
08/24/2004	In Progress

About Me

08/16/2004	In Progress
------------	-------------

Credits

09/03/2004	Completed
------------	-----------

Post HS

09/03/2004	In Progress
------------	-------------

2. Assessments (at least 2 types)

Interest

09/03/2004	Completed
------------	-----------

Skills and Abilities

09/03/2004	Not Needed
------------	------------

Personality/Temperament

09/03/2004	Completed
------------	-----------

Other Assessment (Type in the name)

09/03/2004	I took the PLAN in 10th grade
------------	-------------------------------

3. Additional Elements Needed

Resume

09/03/2004	In Progress
------------	-------------

Employment Application 09/03/2004 Completed

Post-Secondary Application 09/03/2004 Completed

ACT (only if needed) 08/16/2004 Completed

PSAT (only if needed) 09/03/2004 Not Needed

SAT (only if needed) 09/03/2004 Not Needed

Other Test (Type name of test and results) 09/03/2004 Took the SUGT test and received a score of 1765

College Visit (Type name of College visited) 09/03/2004 I have visited both UMD and Saint John's

BST Reading 08/16/2004 Needs to take again

BST Math 08/16/2004 Passed

BST Writing 08/16/2004 Passed

Other Test (Type name of test and results) 09/03/2004 I am thinking about a military career so I too the ASVAB Test last spring

Senior Project (if required) 09/03/2004 In Progress

I have reviewed My Six Year Plan with: (Required entries include parents/guardian, advisor and school counselor.)

09/08/2004	My Parent/Guardian
09/08/2004	My Advisor

I have also reviewed Six Year Plan with these other people.

09/08/2004	My Grandfather
09/08/2004	It's a good idea to talk to others about what you plan to do in the future. This section allows you to list those people you have talked to. The section above this one is where you check off that you have shared your plan with your parents/guardian, your advisor and your school counselor.

Six Year Plan Review and Verification

At least twice each year during the course of your high school career your advisor will verify that you have a detailed, up-to-date, viewable plan for your future that meets graduation requirements.

Plan Status Reviewed by Staff 08/16/2004 Not up to date, recorded by G Adams

Final Plan Approval for Graduation
(Class of 2008 and beyond only)

08/16/2004 Incomplete, recorded by G Adams

Counselor/Advisor Notes

Note

09/03/2004 from D Labore If you are really interested in Veteranarian Science you might want to take Anatomy and Physiology

09/03/2004 from G Adams It would be nice for the person who is typing this message to have thier direct email address listed next to the comment so the student can send a message directly to the person writing it. Otherwise it requires that the person the message is for must be looking at the student

08/31/2004 from D Labore Summer School registration begins in May. Come and see me for an application. Mr. LaBore, your counselor

07/19/2004 from D Labore You should take the Basic Skills Math class next term. If you do not pass the BST Math Test then you might want to go to summer school for extra help

Reply

09/03/2004 I think you should consider becoming a school district bureaucrat! Dan, I'm just testing the automatic e-mail response to staff.

09/03/2004 Once email addresses are added to Campus we may be able to send a formatted message to the staff member or student saying a message is waiting. Testing email response 5

08/31/2004 This is a test to see if it goes to my email.

07/19/2004 When can I sign up for summer school? Test 2

AMERICAN Educator

**It's Time To
Tell the Kids:
If You Don't
Do Well in
High School,
You Won't Do
Well in College
(or on the Job)**



It's Time To Tell the Kids: If You Don't Do Well in High School, You Won't Do Well in College (or on the Job)

By James E. Rosenbaum

Every year I ask my college class how many students have seen a high school teacher cry, and most students raise their hands. When I ask what provoked the crying, most stories are about teachers who threaten to give students bad grades and students who do not care. When I ask my colleagues the same question about their high school teachers from one or two generations ago, virtually none can recall such tears. This is not a systematic survey, but it suggests a big change.

Today, nearly all high school seniors believe that they are going to college—and that bad grades won't stop them. They are right: With the dramatic increase in open admissions colleges, it is true that they can go.

But as I report in my recent book *Beyond College for All*, students who perform poorly in high school probably won't graduate from college—many won't even make it beyond remedial courses. High enrollment rates and low graduation rates are well-known facts of life in most open admissions and less selective colleges (both two- and four-year). The tight connection between high school preparation (in terms of both the rigor of courses taken and grades received) and college completion are well known to statisticians, researchers, and policymakers who follow such matters.

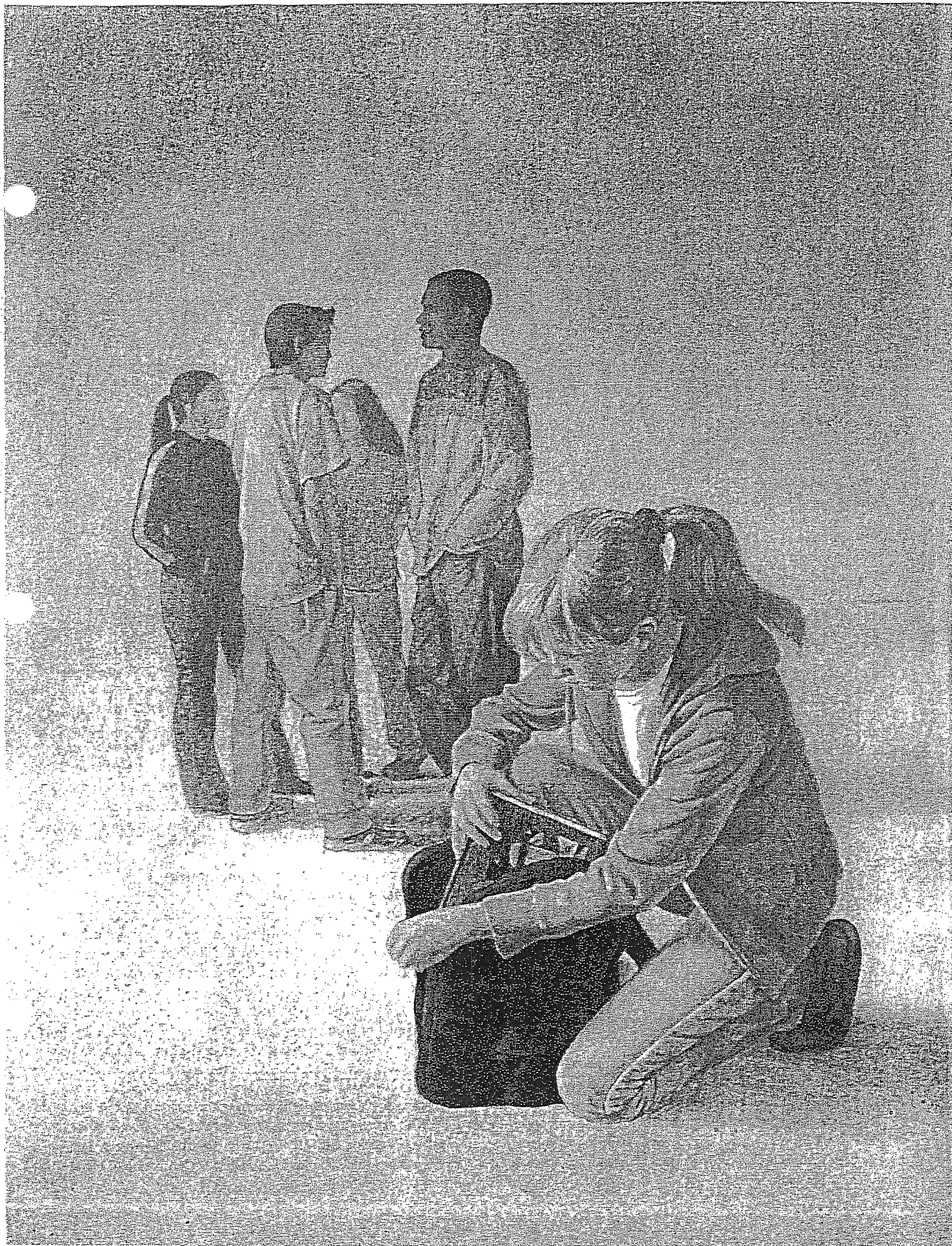
But research suggests that students still do not understand this connection. Consider the following: Seventy-one percent of the class of 1982 planned to get a college degree. Ten years later, 63.9 percent of those with A averages had attained an A.A. degree or higher, but only 13.9 percent of those with C averages (or lower) had done so (Rosenbaum, 1998, 2001). (In a more recent cohort [the class of 1992], students with C averages or lower fared a little better; 20.9 percent attained an A.A. degree or higher within eight years of graduating from high school [Rosenbaum and Gordon-McKeon, 2003]). As of 1992, 84 percent of high school se-

niors planned to get a college degree (NELS, 1992); but data from the high school classes of 1972, 1982, and 1992 tell us that *only 45 to 49 percent of students who enter college and earn more than 10 credits actually earn a bachelor's degree*—many even fail to earn 10 credits (Adelman, 2004). For students with high school averages of C or lower, *the chances that they will earn even one college credit are less than 50-50* (Rosenbaum, 2001). Do your students know that? Do your colleagues? Did you know that?

Despite the availability of open admissions institutions and increased student aspirations for college degrees—factors that increase college *enrollment*—the easiest-to-use predictor of a student's likelihood of *graduating* from a two- or four-year college is still his or her high school grade point average.* Although any single grade is imperfect, when averaged over a high school career, the grade point average is an excellent predictor of how a student will do in college. This has always been true and there is no reason to expect it to change. Unfortunately, our well-intentioned efforts to encourage all students to go to college regardless of their grades inadvertently gives them the impression that high school grades don't matter.

In this article, we will look at the facts, indeed the tragedy, behind the façade of widespread college entry—and at what we can do to change the picture, either by increasing the odds that college enrollment will lead to college gradua-

* Grade point average is the easiest-to-use predictor of college success. Research by Clifford Adelman (1999), however, shows that the intensity and quality of one's high school curriculum is actually an even more powerful predictor. But since course content and teacher expectations vary widely from school to school, making use of this indicator can be difficult. Nonetheless, the gist of both Adelman's and my research is clear: College-bound students should take the most difficult courses possible and work hard to earn the highest grades possible. To read more about Adelman's findings, see the sidebar on page 14.



tion or by helping students find more productive, successful post-high school paths.

New Dreams, New Misconceptions

The past 40 years brought three radical social transformations that together have dramatically increased the percentage of students who want to attend college. First, the earnings advantage of college graduates has grown (Grubb, 1996). Second, college—especially community college (a minor factor in the prior generation)—has become much more accessible. In the past four decades, while enrollments at four-year colleges doubled, enrollments increased five-fold at community colleges (NCES, 1999). Third, and perhaps most remarkably, virtually all community colleges adopted a revolutionary policy of open admissions. Unlike many four-year colleges, virtually all two-year colleges opened their doors to admit all interested high school graduates, regardless of students' prior academic achievement. Even high school graduates with barely passing grades are routinely welcomed because almost all two-year colleges offer a wide array of remedial courses. Indeed, in many cases, students do not even have to be high school graduates because most two-year colleges offer these students access to some non-credit courses, including GED courses.

These three transformations have dramatically altered the rules of college attendance and given students remarkable new opportunities. However, as with all revolutions, there are also unintended consequences. The revolutions spawned a set of myths—we'll call them misconceptions—that combined to send a message to students: Don't worry about high school grades or effort; you can still go to college and do fine. This message has not been sent to high achievers aiming for prestigious colleges, where grades and scores matter—and the students headed there know it. But it is the message that students who know little about college have received—particularly those whose parents did not go to college. These students (and their parents) are being misled with disastrous consequences. Their motivation to work hard in high school is sapped; their time to prepare for college is wasted; their college savings are eaten up by remedial courses that they could have taken for free in high school; and their chances of earning a college degree are greatly diminished. Further, the effect on many colleges has been to alter their mission and lower their standards.

This article reviews some of the misconceptions spawned by these three revolutions and rebuts them—and considers how schools can mitigate the terrible impact these misconceptions are having on individual students and, inevitably, on the overall school environment.

Misconception 1: College success is not linked to high school preparation.

A national survey (NELS, 1992) found that 84 percent of high school seniors in the class of 1992 planned to get a two- or four-year college degree. Even students with bad grades, low test scores, and poor high-school attendance planned to complete a college degree. Attaining a college degree can be difficult even for students who have worked hard and done well in high school; for those who haven't, it is

nearly impossible. Look at the table below on grades and college completion for the class of 1982. On average, 37.7 percent of seniors with college plans earned a two-year or higher degree. But low high school grades cut students' chances markedly—only 13.9 percent of seniors with averages of C or lower completed college. For this 13.9 percent, open admissions at community colleges provided an extremely helpful second chance. However, for the vast majority of students, the other 86 percent, their second chance was only another experience of failure. Shouldn't we tell the students: If you want to graduate from college, exert the effort and get good grades in high school?

In the class of 1982, 86 percent of college-bound students with poor grades didn't graduate from college.

Average high school grades	As	Bs	Cs or lower	All
Percentage attaining A.A. or higher	63.9	37.1	13.9	37.7
Percentage not attaining any degree	36.1	62.9	86.1	62.3

Seniors with college plans (A.A. or higher) who complete an A.A. degree or higher within 10 years of high school graduation.

Source: *Beyond College for All*; High School and Beyond data.

Misconception 2: College plans lead to increased school effort.

It is often assumed that planning to go to college makes students more motivated, giving them reason to work hard in high school. Unfortunately, this is often not the case. For many decades, work-bound students believed that high school achievement would not influence their future careers (Stinchcombe, 1965), but now many college-bound students also hold this belief. In a survey of over 2,000 seniors in 12 urban and suburban high schools, researchers found that almost 40 percent of college-bound students believed that school effort had little relevance for their future careers (Rosenbaum, 1998; cf. Steinberg, 1996).

Misconception 3: High school homework doesn't matter for college success.

Since open admissions policies allow everyone to enter college, no matter how poorly they do in high school, some students report that they can wait until college to exert academic effort. But research shows that effort during high school is absolutely essential. Take homework, for example: Students doing no homework end up with 1.2 years less education and 19 percent lower earnings than average. Students doing 15 hours or more a week of homework attain almost 1.5 more

James E. Rosenbaum is professor of sociology, education, and social policy at Northwestern University and a faculty fellow with the university's Institute for Policy Research. He is author of Beyond College for All: Career Paths for the Forgotten Half and Crossing the Class and Color Lines: From Public Housing to White Suburbia.

What You Need To Do in High School If You Want To Graduate from College

Let's start by getting the cold, hard truth out in the open: Less than 40 percent of students who plan to go to college actually earn a two- or four-year degree within 10 years of graduating from high school (Rosenbaum, 2001). Do you know what it takes to succeed in college? The simple answer is that if you take hard classes, do all of your homework, and get good grades in high school, you will be ready.

1. GRADES MATTER. Your high school grade point average is a great predictor of whether or not you will earn a college degree. Take a look at the chart (below left). Less than 14 percent of students with C averages or lower in high school earned a two- or four-year college degree. Even worse, 52 percent of college students who had a C average (or lower) in high school didn't earn even one college credit! What are they doing while they are "in college"? They are spending time and money on remedial classes that repeat high school work and earn no college credit.

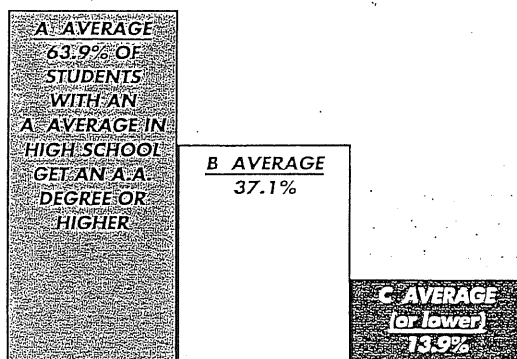
2. HOMEWORK MATTERS. Homework might seem like a waste of time, but it teaches you content, time-management, and discipline—all of which you'll need in college. Forty-four percent of high school seniors do less than three hours of homework in a week; only 14 percent of seniors do more than 10 hours. But homework time strongly

predicts college success: Over half the students who do more than 10 hours of homework a week will get a four-year college degree; only about 16 percent of those doing less than three hours of homework a week will earn a bachelor's degree.

3. MATH COURSES MATTER. The further you go in math in high school, the better your chances of earning a college degree. Look closely at the chart (below right). Completing Algebra II (or a higher course) is a huge help in earning a college degree. And if you really want a bachelor's degree, you better go as high as you can in math while you're still in high school.

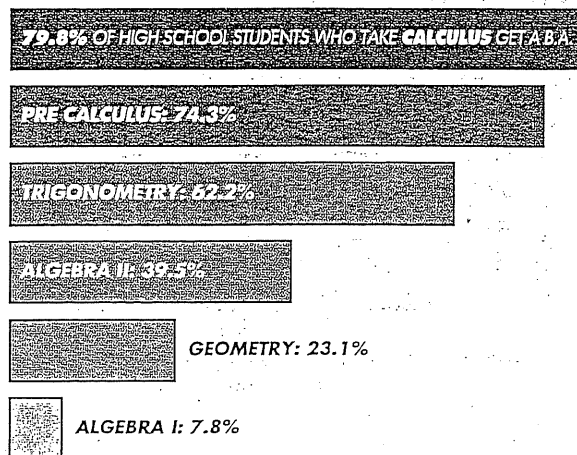
Even if you don't go to college, your high school grade point average is still important because it predicts future income. High-school grades do not predict income right after high school, but they do strongly predict long-term income. If you don't go to college, an increase of one letter grade (from C to B) in your high school grade-point average typically increases income by 13 percent by age 28! (Compared to people who haven't gone to college, a four year degree typically increases income by about 14 percent.) So even if you don't go to college, improving your high school grades from Cs to Bs improves the chances that you will be able to support a family.

Earning a two-year college degree or higher depends a lot on what your high school GPA is.



Percentage of twelfth-graders who say they are going to college who have actually earned a two- or four-year degree 10 years after high school.

Getting a four-year college degree depends a lot on how far you go in high school math.



Percentage of high school graduates earning a B.A. by highest level math course taken in high school.

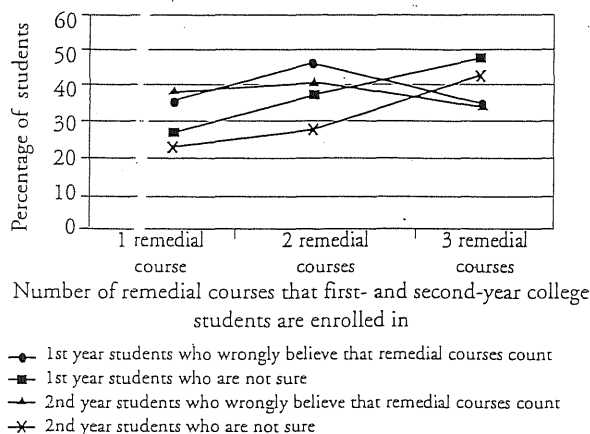
years of education and attain 16 percent higher earnings than average. This 2.7-year spread in educational attainment and 35 percent spread in earnings are both extremely large (especially considering that these outcomes are associated with variation in self-reported homework time in high school).

Misconception 4: Going to college means taking college-level classes.

If you are taking classes in a college, are you taking college classes? Not necessarily. Many “college students” are actually in remedial courses—high school-level classes (or even lower) that give no college credits (Deil-Amen and Rosenbaum, 2002). The best estimates of the extent of remedial education come from careful analyses of college transcripts from national samples of students in the classes of 1982 and 1992. From 1982 to 1992 there has been substantial improvement in the need for remediation *among students entering four-year colleges*. Forty-four percent of those from the class of 1982, but only 25 percent from the class of 1992 (still too many), took at least one remedial course. Unfortunately, there has not been a similar improvement *among students entering two-year colleges*. Sixty-three percent of those from the class of 1982, and 61 percent from the class of 1992, took at least one remedial course (Adelman, 2004). A more recent survey in two urban community colleges found that 25 percent of students were taking three or more remedial courses (Deil-Amen and Rosenbaum, 2002).

Moreover, in an effort to reduce students’ feelings of inferiority, college advisors often downplay the fact that courses are remedial. As a result, *many students do not even realize the nature of their coursework*. In one research survey, students were given a list of the colleges’ remedial courses, asked which ones they had taken and whether the courses counted toward a degree. From interviews with administrators, the researchers knew that none of these courses counted toward a degree. Unfortunately, most students did not (see chart below). Among first-year students taking three remedial courses, 36 percent reported that these courses counted, and another 48 percent were not sure. Even among second-year students taking three remedial courses, 36 percent believed the courses counted for college credit and 44 percent were unsure (Deil-Amen and Rosenbaum, 2002).

Many college students in remedial courses believe the courses count toward a degree.



Misconception 5: Going to college for a two-year degree takes two or four years.

How long does a two-year associate’s degree take? If you think the answer is obvious, you are wrong. At one community college, a top administrator confided that because of remedial needs, a “two-year associates degree” takes full-time students an *average* of 3.5 years to complete. Statistics like this are not widely known—with three serious implications. First, since the remedial courses often carry no credit, students who plan for two-year or four-year degrees discover that they cannot complete their degrees in the time they have scheduled or within the budget they have planned. Second, their failure to collect credits is exacerbated by the “secret” nature of the remedial courses; discovering after 1.5 years that you are still two years away from a two-year degree is not only demoralizing, but may present virtually insurmountable time and budget problems. Third, high school students heading toward college do not understand college remedial placements. They know that their older peers who graduated high school with poor grades went on to college—and they assume they can, as well. But most high school students probably do not realize that these “college students” are not accumulating college credits and are unlikely to graduate. This partial picture may encourage lax academic effort and college-for-all fantasies on the part of many high school students—maybe even on the part of school faculty. (These fantasies are fed by high school administrators who boast about the high percentage of students they send to college—but neglect to mention how few graduate. More on this later.)

Misconception 6: School counselors should not offer discouraging words about the hard work necessary for college success.

Given the widespread public belief in the misconceptions above, counselors rarely discourage college plans or suggest alternatives. A recent study in eight diverse urban and suburban high schools found that even if students had poor grades, school counselors did not dissuade them from attending college, *nor did they warn students when they had poor chances of college success* (Krei and Rosenbaum, 2001; Rosenbaum, Miller, and Krei, 1997). National data suggest that these practices are widespread. While only 32 percent of a national survey of seniors in 1982 indicated that their counselors urged them to go to college, 10 years later, fully 66 percent of seniors made the same statement (Boesel, 2001; Gray, 1996). Indeed, 57 percent of seniors in the bottom half of the academic rankings reported that counselors urged them to attend college.

In interviews we conducted with counselors, it was clear that counselors who do wish to warn students that they are unprepared for college believe that they lack the authority to do so (Rosenbaum et al., 1997). As one counselor said, “Who am I to burst their bubble?” At the same time, counselors report that when they warn students that they are unprepared for college, parents complain, and principals support the parents. Counselors are not sure they have the authority to be candid and to report that students are not well prepared for college. The following example, though just an

All Good Jobs Don't Require a College Degree...

But getting a good job without a college degree depends a lot on high school effort—and the support a high school provides.

Encouraging students to attend college despite their poor academic preparation is a practice based in part on the premise that all decent jobs require a college education. Although average earnings are higher for those with college degrees (Carnevale and Desrochers, 2002), it is easy to misread these numbers.

First, these averages conceal much variation. College degrees do not always have payoffs. And, college degrees are not required to enter many rewarding jobs, including construction trades, clerical and administrative support, auto and airplane mechanics, printing, graphics, financial services, and many government and social services. Union electricians, machinists, tool and die makers, and sheet-metal workers, for instance, have high-demand skills, excellent benefits, good working conditions, and annual salaries that often exceed \$45,000 by age 28 (and are much higher with overtime).

Second, researchers who analyze jobs and talk to employers find that while today's typical job requires higher skills than in the past (when many jobs required only physical strength), the skills required for these jobs are strong high school-level skills—math, reading, and writing at a ninth-grade level (Murnane and Levy, 1996), not college-level skills. Similarly, new research on the skills needed for many good jobs (meaning those that pay enough to support a family and have the potential for advancement) are also high school-level skills, such as four years of English and mathematics through Algebra II (American Diploma Project, 2004). Unfortunately, over 40 percent of high-school seniors lack ninth-grade math skills and 60 percent lack ninth-grade reading skills (Murnane and Levy, 1996). So students do not need to go to college to get a good job, but they do need to master high school-level skills. Research shows that greater

mastery of these skills in high school leads to higher earnings over time: For youth who get no college degree, a rise of one letter grade in their high school grade point average (from C to B) is associated with a 13 percent earnings gain at age 28! That's almost as much as the pay differential associated with a bachelor's degree, which is just over 14 percent more than students without a college degree (Miller, 1998; Rosenbaum, 2001). Solid high school skills prepare students for entry-level positions and keep the door to promotions open (Rosenbaum, 2001).

Third, employers report that for many jobs, non-academic skills (like timeliness, diligence, and social competence) are key (Shapiro and Iannozzi, 1999). Analyses of a national survey indicate that students' educational attainment and earnings nine years after graduating from high school are significantly related to their non-cognitive behaviors in high school—sociability, discipline, leadership, homework time, and attendance—even after controlling for background characteristics and academic achievement (Rosenbaum, 2001). High schools can provide these skills just as well as colleges can.

Fourth, for some low-achieving high school students, getting a good job after high school can be more lucrative than trying to earn a college degree. As we saw in the main article, only about 14 percent of students with C averages or lower in high school earn a college degree (B.A. or A.A.). Of these low-GPA high school students, those who do complete a B.A. will typically earn 4.3 percent more than students without a college degree—but this is less than one-third the extra earnings that the typical college graduate enjoys. Those with low high school GPAs who earn an A.A. will typically earn 7.2 percent less than high school graduates with no college degree (Rosenbaum, 2001).

So the vast majority of students who don't do well in high school would be better off, in terms of future income, finding a good job than going to college. But their ability to find out about these jobs, prepare for them, and get placed in them depends a lot on the support they get from their high school. Indeed, vocational teachers report that they *are* able to help students get jobs, even students from disadvantaged backgrounds or with disabilities. They can accomplish this because they provide employers with trusted recommendations about students' social skills and work habits.

Currently, about 9 percent of work-bound high school graduates get jobs after graduation through school-based job placement (mostly from vocational teachers). These students have 17 percent higher earnings by age 28 than students who find their own jobs after high school (Rosenbaum, 2001). Moreover, school-based job placement helps more blacks and females than white males (Rosenbaum 2001), so it helps students who normally have the greatest difficulties in the labor market.

The true lesson of the new labor market is this: For many of the skilled jobs in the new economy, what students really need is to acquire good work habits and solid high school-level skills. But, employers argue that they cannot trust that the high school diploma certifies knowledge of these high school-level skills. As a result, employers report using *college* degrees to signal that applicants possess *high school* skills. If, instead, the high schools provided trusted signals of high school competencies, the pressure to send all students to college could diminish. And let's not forget that high schools can do a lot to help their non-college bound youth find productive jobs and lead fulfilling lives.

—J.R.

anecdote, offers some sense of the pressures that counselors feel. A student with an IQ of 70 wanted to be a doctor, and although the counselor tried to explain the difficulties this student would face, he ultimately advised the student to attend “a two-year college first and see how it goes.”

Clearly, some counselors do not feel free to give their professional opinions. If they are too candid, they can be accused of “low expectations,” even if their concerns arise from students’ school records. When counselors fear they may have to pay for honestly explaining students’ future options, they back away from doing so. They not only yield to parents’ wishes, but they sometimes change their initial advice to avoid trouble. Many counselors report that they advise

students with D-averages to attend a community college and later transfer to a four-year college. One student with a D-average wanted to apply to Harvard, so his counselor suggested that he could begin at community college and then look to transfer to Harvard after two years. The college-for-all mentality is a perfect way to avoid unpleasant issues that are likely to arise as students make plans for the future.

In the past, counselors often acted as “gatekeepers,” advising low-achieving students on alternatives to college (Cicourel and Kitsuse, 1963; Rosenbaum, 1976), including providing advice about which non-college training options could lead to well-paid, respected occupations and even using their contacts to place non-college-bound students

High School Preparation Is the Best Predictor of College Graduation

What increases students’ chances of earning a bachelor’s degree? According to a widely-acclaimed study of over 10,000 students, the high school curriculum is key. Called *Answers in the Tool Box*, this study by U.S. Department of Education researcher Clifford Adelman examined more than 20 variables—including high school courses, educational aspirations, race, socioeconomic status (SES), on-time versus late high school graduation, and parenthood prior to age 22—to determine what really influenced the college completion rates of these students.

In Adelman’s study, about 40 percent of students attended a four-year college and about 25 percent earned a bachelor’s degree. What were the main differences between those who did and did not graduate? Socioeconomic status had some impact (but it was minimal after the first year of college), and race did not have a statistically significant impact at all. Much more important than either SES or race was the students’ academic preparation for college (which Adelman defined as students’ high school courses, scores on a short SAT-type test, and GPA/class rank).

Adelman’s study clearly shows that for students of all backgrounds, tackling a tough curriculum in high school is the best way to maximize their chances of earning a B.A. Here are a few more findings to note:

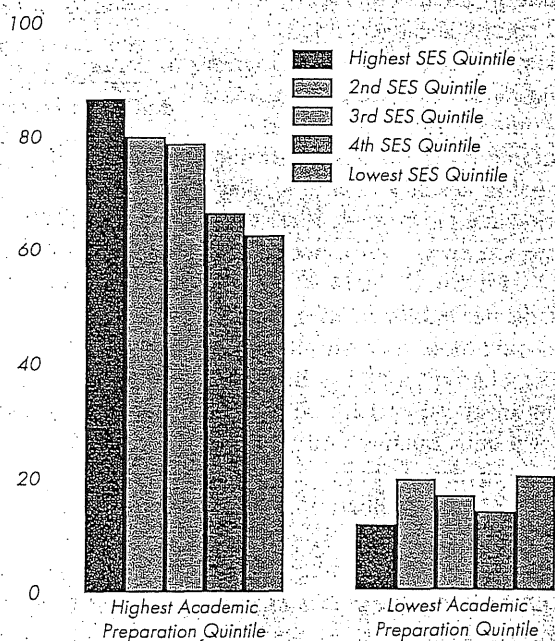
- Of all the high school indicators of academic preparation, the one that is the strongest is taking rigorous and intense courses in high school.
- Taking rigorous and intense high school courses has a greater impact on African-American and Latino students than on white students.
- Of all the high school courses, the highest level of mathematics taken is the most important for college success. The odds that a student who enters college will complete a bachelor’s degree more than doubles if that student completed a mathematics course beyond Algebra II (e.g., trigonometry or pre-calculus) while in high school.

Adelman’s study has many more interesting findings. To read *Answers in the Tool Box*, go to www.ed.gov/pubs/Toolbox/index.html.

— EDITORS

Academically well-prepared students are likely to graduate from college regardless of their social background. Unprepared students of all backgrounds are not likely to do so.

The graph below breaks students into quintiles based on their level of academic preparation and their socioeconomic status (SES). As you can see, among the lowest SES students, a bachelor’s degree was earned by 62 percent of those who were well prepared, but only 21 percent of those who were not. Similarly, among the highest SES students, 86 percent of those who were well prepared—but only 13 percent of those who were not—earned a bachelor’s degree.



Percentage of students who graduated from a four-year college by socioeconomic status (SES) and academic preparation.

into respectable jobs. (For more information on the importance of high school for the non-college bound, see p. 13.)

If heavy-handed gatekeeping by counselors has indeed become less common, no one will grieve its loss; only two generations ago, counselors often had a decisive, sometimes secretive, impact on which colleges students would apply and go to. But if counselors are not giving students the information they need about the requirements for completing college, then many students may be aimlessly drifting through high school and community colleges without any notion of what requirements they will have to meet to earn a degree. In that case, gatekeeping has not ended, it has only been deferred, and many students will haplessly find themselves failing out of college without any forewarning of what is happening. Today, many students are making college plans that are not likely to be realized. Parents, administrators, counselors, and teachers must work together to understand the connection between high school effort and college success—and to convey this reality to students. It should go without saying that counselors can't take on this countercultural mission on their own. In the next article, high school staff can see what students need to know to be prepared for college; for distribution to students, a college fact sheet is on page 11.

The New Rules of the Game

Beyond the negative effect that the college-for-all push has on individual students, there is the broader negative effect it has on high schools' academic climate. Seeing that college access is guaranteed, some students believe that they can challenge teachers' authority and suffer no penalty; some teachers may respond to their diminished authority by leaving the profession or by reducing their demands on students (Sedlak et al., 1986). While these changes have their greatest impact on low-achieving students, even high-achieving students will be in classes where teachers' authority is questioned, and such students may wonder if they could prepare for college with less effort.

Those looking for justice may see it in the finding that unmotivated students will end up worse off—stuck with remedial classes, fewer college credits and degrees, and lower earnings. But this is not a happy ending. Students waste their high school years, disrupt high school for others, drag down the standards in high school, and force colleges to provide high school courses as an increasingly larger segment of their curriculum.

How can we improve the situation? Since the playing field has drastically changed in the world of higher education, new “rules of the game” have arisen. New high school practices must be established to match them. These new rules of college can be summarized succinctly:

- All students can plan to get a college degree; but if they are unprepared, they must be willing to repeat high school courses in college, spending the extra time, money, and effort in non-credit, remedial courses.
- All students can attend college, but low-achieving students should be warned about remedial courses and their own unlikely prospects for graduation.

- College completion, as opposed to enrollment, requires increased high school effort. If students delay their academic effort until they get to college, the delay will make degree completion take longer, cost more, and be less likely.
- Policies to improve students' preparation for college do not remove a school's obligation to provide students with information about their college prospects.
- Students whose college prospects are dim should be provided good information about alternatives to college that can lead to a successful employment life. These students can also be informed about opportunities to attend college later in life.

School staff could play a critical role in providing information and resources to help students make choices that will support their own long-term goals before it is too late. Unfortunately, it seems that students are not getting this information, nor is there a clear mandate for high school counselors or teachers (or, for that matter, administrators) to give this advice. How could a better job be done in this area?

1) **High schools should monitor and publicize the academic preparation and college completion rates of their college-bound graduates.** It is common practice for high schools to trumpet the percentage of kids they send on to college—as if this were the major indicator of a high school's success. Instead of focusing on just the number of seniors who go to college, high school administrators should monitor their graduates' preparation for college-credit classes (through, for example, achievement test scores and success in the first year of college) and brag about that: College preparation, not college attendance, is the real achievement. They should also inform students about degree completion rates for prior graduates (by showing the percentage of students who earn college degrees broken down by grade point average, for example). In addition, high schools should provide information about various local colleges, including degree-completion rates and the average number of years students took to complete their degrees.

2) **High schools should require students aiming for college to take modified college placement exams.** Society needs to give students clear information about the achievement prerequisites for college courses. Since colleges already give tests to assess whether incoming freshmen are assigned to credit or remedial classes, one solution is relatively straightforward: These tests could be modified and given to high school students to tell them whether they are *ready* for college-level work. If colleges do not want to prepare a new test, they could recommend an existing one or simply give high schools the previous year's freshman placement exams. These exams could be given to high school seniors, and a modified exam could be given to high school sophomores, to tell them whether they are making satisfactory progress toward college. If not, students must improve their achievement, revise their goals, or accept the fact that they will have to take remedial courses in college.

Having high school students take college placement exams may appear unnecessary since more and more states

(Continued on page 41)

What Does It Mean To Be Prepared for College?

*(or for Jobs in the High-Growth,
High-Performance Workplace)*

As James Rosenbaum notes, there are currently good jobs with which one can support a family (such as in construction trades, clerical and administrative support, graphics, and many government and social services jobs) that students with strong high school records and no college degree can enter. But students who want to succeed in college or who want to enter the growing high-performance job sector—or who want to keep their options as broad as possible—must reach an academic level that is higher than what is typically required for a high school diploma. But how high? What does the level of achievement they must strive for look like? A new report by the American Diploma Project (ADP) tries to answer these questions.

Called Ready or Not: Creating a High School Diploma That Counts, this new report establishes English and mathematics benchmarks that explain what high school students need to be prepared for college or good jobs in the high-performance workplace; offers examples of college coursework and workplace tasks that draw upon the benchmarks; and recommends helpful policies that should be adopted by states, postsecondary institutions, the federal government, and business leaders. Here, we provide excerpts adapted from the report, especially from its sections on benchmarks and postsecondary assignments.

—EDITORS

Staggeringly high college dropout rates suggest that the high school diploma does not in itself signal readiness for college. What does readiness for college require? And what does it mean to be “ready” to enter the high-performance workplace that increasingly will be the source of

The American Diploma Project is a partnership of Achieve, Inc., The Education Trust, and the Thomas B. Fordham Foundation. To read the full report, go to www.achieve.org.

the most promising jobs for high school graduates? To answer these questions, ADP has worked closely with K-12, postsecondary, and business leaders in five partner states (Indiana, Kentucky, Massachusetts, Nevada, and Texas) for the past two years to identify the English and mathematics knowledge and skills needed for success in both college and such workplaces. We first asked leading economists to examine market projections for the most promising jobs—those that pay enough to support a small family and that provide real potential for career advancement in industries such as healthcare, high-tech manufacturing, information technology, and telecommunications—and to pinpoint the academic knowledge and skills required for success in those occupations. We also worked closely with two- and four-year postsecondary leaders in partner states to determine prerequisite English and mathematics knowledge and skills required for success in entry-level, credit-bearing college courses.

The resulting benchmarks are ambitious, reflecting an unprecedented convergence in what these employers and postsecondary faculty need from new employees and entering freshmen. In math, they contain content typically taught in high school courses like Algebra I, Algebra II, Geometry, and Data Analysis and Statistics. In English, they demand strong oral and written communication skills that are staples in college classrooms and high-performance workplaces. They also describe analytical and research skills currently associated only with advanced and honors courses in high school, but which our employers and postsecondary faculty told us are required skills for students who want to succeed in college and the high-performance workplace.

The benchmarks also attempt to indicate the rigor of the expectations by providing examples of the kinds of reading



and mathematical problems the benchmarks are meant to describe. In English, for example, it is not enough to ask high school students to analyze texts. According to our employers and postsecondary faculty, students should study particular kinds of *rigorous* texts. For this reason, the ADP English benchmarks are to be used in coordination with the reading lists developed by two ADP partner states, Indiana (excerpts shown, opposite page) and Massachusetts. These lists not only define the quality and complexity of reading expected of all high school graduates, but also suggest a common “cultural literacy,” including representative works of various cultures both within and beyond the United States. In math, however, rigor is illustrated differently by embedding sample problems within the benchmarks themselves to illustrate the quality and complexity of the corresponding mathematics benchmarks.

What makes the ADP benchmarks unique is that they are accompanied by actual examples of the kinds of workplace tasks and postsecondary assignments that high school graduates will confront. It is important to note that the tasks and assignments are *not* meant to describe the quality and complexity of *high school* assignments. Although they may be used in the future to inform the development of high school lessons, the tasks and assignments are designed simply to illustrate the intellectual rigor of real-world environments beyond high school and the applicability of the ADP benchmarks in postsecondary and workplace settings. These benchmarks can also be used to assess the adequacy of the high school curriculum and to map back through earlier grades to refine state standards and assessments in English and math.

English Benchmarks

The ADP college and workplace readiness benchmarks for English are organized into eight strands: Language; Communication; Writing; Research; Logic; Informational Text; Media; and Literature. Shown in these excerpts are all of the language, research, and literature benchmarks, plus about half of the communication benchmarks.

Language

Writers and speakers are taken seriously when their vocabulary is sophisticated and their sentences are free of grammatical errors. Without fail, employers and college faculty cite correct grammar, usage, punctuation, capitalization, and spelling as absolutely essential to success in classrooms and workplaces beyond high school. Whether presenting a marketing concept to a team of colleagues or clients or presenting an interpretation of a secondary source in a college seminar, students and employees will need facility with these fundamental skills for the successful exchange of ideas and information.

Benchmarks. The high school graduate can:

1. Demonstrate control of standard English through the use of grammar, punctuation, capitalization, and spelling.
2. Use general and specialized dictionaries, thesauruses, and glossaries (print and electronic) to determine the definition, pronunciation, etymology, spelling, and usage of words.
3. Use roots, affixes, and cognates to determine the meaning of unfamiliar words.
4. Use context to determine the meaning of unfamiliar words.
5. Identify the meaning of common idioms, as well as literary, classical, and biblical allusions; use them in oral and written communication.
6. Recognize nuances in the meanings of words; choose words precisely to enhance communication.
7. Comprehend and communicate quantitative, technical, and mathematical information.

Communication

Employers and college professors cite strong oral communication skills as being so essential to success that they insist schools should emphasize them, simultaneously with the transmittal of other academic knowledge. Success in credit-bearing college coursework, whether in the humanities, sciences, or social sciences, depends heavily on effective communication about the concepts and detailed information contained within readings, lectures, and class discussions. Success in the workplace, whatever the profession, is also heavily dependent on one's ability to listen attentively to colleagues or customers and to express ideas clearly and persuasively.

Benchmarks. The high school graduate can:

1. Give and follow spoken instructions to perform specific tasks, to answer questions, or to solve problems.
2. Summarize information presented orally by others.
3. Paraphrase information presented orally by others.
4. Identify the thesis of a speech and determine the essential elements that elaborate it.
5. Analyze the ways in which the style and structure of a speech support or confound its meaning or purpose.
6. Make oral presentations that:
 - exhibit a logical structure appropriate to the audience, context, and purpose;
 - group related ideas and maintain a consistent focus;
 - include smooth transitions;
 - support judgments with sound evidence and well-chosen details;
 - make skillful use of rhetorical devices;
 - provide a coherent conclusion; and
 - employ proper eye contact, speaking rate, volume, enunciation, inflection, and gestures to communicate ideas effectively.

Samples from Indiana's Reading List for Grades 9-12

The following samples provide a taste of the quality and complexity of the suggested reading materials. The full list includes classic and contemporary fiction; historical fiction; science fiction and fantasy; folklore, fairytales, and mythology; poetry; short stories; drama; essays and speeches; science, social studies, and mathematics nonfiction; biography and autobiography; magazines and newspapers; reference tools; and informational, technical, and practical documents.

Fiction: Classic and Contemporary

The Abduction, Newth, Mette and Nunnally, Tiina

The Adventures of Augie March, Bellow, Saul

The Adventures of Huckleberry Finn, Twain, Mark

The Age of Innocence, Wharton, Edith

Animal Farm, Orwell, George

The Assistant, Malamud, Bernard

Autobiography of Miss Jane Pittman, Gaines, Ernest J.

The Bean Trees, Kingsolver, Barbara

Billy Budd, Melville, Herman

Bless Me, Ultima, Anaya, Rudolfo

Buried Onions, Soto, Gary

Catcher in the Rye, Salinger, J.D.

Ceremony, Silko, Leslie Marmon

The Contender, Lipsyte, Robert

Crime and Punishment, Dostoyevsky, Fyodor

Science Fiction/Fantasy

1984, Orwell, George

2001: A Space Odyssey, Clarke, Arthur C.

Brave New World, Huxley, Aldous

Fahrenheit 451, Bradbury, Ray

Foundation, Asimov, Issac

The Lord of the Rings, Tolkien, J. R.R.

The Martian Chronicles, Bradbury, Ray

The War of the Worlds, Wells, H.G.

Watership Down, Adams, Richard

Biography/Autobiography

Growing Up, Baker, Russell

Alexander, Graham Bell: Making Connections, Pasachoff, Naomi

John Wilkes Booth: A Sister's Memoir, Clarke, Asia Booth

Out of Darkness: The Story of Louis Braille, Freedman, Russell

The Childhood Story of Christy Brown [previously *My Left Foot*], Brown, Christy

Madame Curie, Curie, Eve

Narrative of the Life of Frederick Douglass, Douglass, Frederick

Barrio Boy, Galarza, Ernesto

Gandhi, Great Soul, Severance, John

A Mathematician's Apology, Hardy, G.H.

Research*

Research requires the ability to frame, analyze, and solve problems, while building on the ideas and contributions of others. As future college students or employees, students will be asked to hone these essential skills with increasing sophistication. Credit-bearing coursework in colleges and universities will require students to identify areas for research, narrow those topics, and adjust research methodology as necessary. College students will be asked to consider various interpretations of both primary and secondary resources as they develop and defend their own conclusions. Thorough research is the foundation of the free exchange of ideas in a postsecondary academic environment. Similarly, in the workplace, employers depend heavily on employees to evaluate the credibility of existing research to establish, reject, or refine products and services.

Benchmarks. The high school graduate can:

1. Define and narrow a problem or research topic.
2. Gather relevant information from a variety of print and electronic sources, as well as from direct observation, interviews, and surveys.
3. Make distinctions about the credibility, reliability, consistency, strengths, and limitations of resources, including information gathered from Web sites.
4. Report findings within prescribed time and/or length requirements, as appropriate.

* These skills, although critical to the study of English, are also necessary to the study of many academic subjects. Therefore, the study and reinforcement of these skills should not be confined to the English classroom or coursework.

5. Write an extended research essay (approximately six to 10 pages), building on primary and secondary sources, that:

- marshals evidence in support of a clear thesis statement and related claims;
- paraphrases and summarizes with accuracy and fidelity the range of arguments and evidence supporting or refuting the thesis, as appropriate; and
- cites sources correctly and documents quotations, paraphrases, and other information using a standard format.

Literature

High school graduates today need to be well read to succeed in college, in careers, and as citizens in our democratic society. Whether navigating the editorial pages of a local newspaper or communicating ideas to fellow colleagues or classmates, high-school graduates who have been asked to analyze a variety of rich literature will be well prepared. Among the benefits of reading literature and carefully analyzing significant works from the literary heritage of both English and other languages is the appreciation of our common humanity. Regular practice in identifying and analyzing the aesthetic and expressive elements of literature also improves the quality of all kinds of student writing. Practice in providing evidence from literary works to support an interpretation fosters the skill of reading any text closely and teaches students to think, speak, and write logically and coherently—priority skills identified by employers and postsecondary faculty. Employers report that employees who have considered the moral dilemmas encountered by literary characters are better able to tolerate ambiguity and nurture problem-solving skills in the workplace. Postsecondary faculty from a wide variety of disciplines note that the skills required by

Sample Postsecondary Midterm Exam in Introductory English

Tests in first-year English courses often require students to identify excerpts from course readings and to explain their significance. To perform well on this midterm exam from Western Nevada Community College, an open admissions institution in Carson City, Nev., students must have a solid understanding of the themes and literary techniques employed in a broad selection of short stories and poems. Students must also be able to describe how the works relate to one another. To do well on this exam, students must bring with them from high school a strong background in writing and analyzing literature; specifically, they must be completely comfortable with language benchmarks 1 and 6, as well as literature benchmarks, 1, 3, 4, and 5, and benchmarks from the other strands such as writing and logic. The readings for this exam are all from *The Norton Introduction to Literature* (shorter eighth edition edited by Jerome Beaty, Alison Booth, J. Paul Hunter, and Kelly J. Mays) and were written by authors such as Ernest Hemingway, Edgar Allan Poe, Anton Chekhov, and Elizabeth B. Browning. About half of the exam is shown here.

Part one: Fiction

Explain the significance of each excerpt, especially the section in bold, as it relates to each story's theme (NOT PLOT) or to the story's main character.

1. "Jupiter was an anomaly. His retrieving instincts and **his high spirits were out of place** in Shady Hill.... Jupiter went where he pleased, ransacking...." ("The Country Husband")
2. "I replied to the yells of him who clamoured. I **re-echoed, I aided, I surpassed them in volume** and in strength. I did this, and the clamourer grew still." ("The Cask of Amontillado")

3. "Her poems are always cool and intellectual; **that is their form, which is contradicted or supported by a gravely sensuous texture.**" ("Our Friend Judith")

Part two: Poetry

Explain the significance of the excerpted lines, focusing especially on the words that are in bold type.

1. "Back from the hospital, his mind rattling/Like the suitcase, swinging from his hand,/That contains **shaving cream, a piggy bank, A book he sometimes pretends to read.**" ("Alzheimer's," p. 637)
2. "My mother, after a life/of it, says, 'This is the last straw./And it is. **We're all clutching.**'" ("You Didn't Fit," p. 635)

Part three: Essay question

Refer to stories we have read ("How," "Hills Like White Elephants," "No One's a Mystery," "The Country Husband," and "Our Friend Judith") as well as several poems ("The Tally Stick," "love poem," "Wedding-Ring," and "What lips my lips have kissed, and where, and why" or any other 20th-century poem we have read) and write an essay on the following topic:

The nature of love and marriage (these are TWO topics), as depicted in 20th-century fiction and poetry, IS or IS NOT consistent. (Choose whichever point of view you think you can best defend by using the above stories and poems as your "support.") You will first have to identify WHAT IS the nature of love and the nature of marriage and state each definition. You also need to explain how you understand the term "is consistent" or "is not consistent."

thorough literary analysis are applicable in a range of other humanities, science, and social science disciplines.

Benchmarks. The high school graduate can:

1. Demonstrate knowledge of 18th- and 19th-century foundational works of American literature.
2. Analyze foundational U.S. documents for their historical and literary significance (for example, The Declaration of Independence, the Preamble to the U.S. Constitution, Abraham Lincoln's "Gettysburg Address," Martin Luther King's "Letter from Birmingham Jail").
3. Interpret significant works from various forms of literature: poetry, novel, biography, short story, essay, and dramatic literature; use understanding of genre characteristics to make deeper and subtler interpretations of the meaning of the text.
4. Analyze the setting, plot, theme, characterization, and narration of classic and contemporary short stories and novels.
5. Demonstrate knowledge of metrics, rhyme scheme, rhythm, alliteration, and other conventions of verse in poetry.
6. Identify how elements of dramatic literature (for example, dramatic irony, soliloquy, stage direction, and dialogue) articulate a playwright's vision.

7. Analyze works of literature for what they suggest about the historical period in which they were written.
8. Analyze the moral dilemmas in works of literature, as revealed by characters' motivation and behavior.
9. Identify and explain the themes found in a single literary work; analyze the ways in which similar themes and ideas are developed in more than one literary work.

Mathematics Benchmarks

The ADP mathematics benchmarks are organized into four strands: Number Sense and Numerical Operations; Algebra; Geometry; and Data Interpretation, Statistics, and Probability. In addition, because the study of mathematics is an exercise in reasoning, the report lists a set of critical reasoning skills that are woven throughout the four strands. These include checking for errors and reasonableness of solutions, distinguishing between relevant and irrelevant information, and making judgments about which operations and procedures to apply in order to solve a particular problem. Shown here are

the algebra benchmarks that all students should master. In the full report there are additional higher-level algebra benchmarks that are required for students who plan to take calculus in college, a requisite for mathematics and many mathematics-intensive majors. To make it easy for readers to refer back and forth between the full report and this excerpt, we have preserved ADP's original numbering system.

Algebra

Mathematicians regularly identify sources of change, distinguish patterns in that change, and seek multiple representations—verbal, symbolic, numeric, and graphic—to express what transpires. The language of algebra provides a means of operating with these concepts at an abstract level and extending specific examples to broad generalizations. Predicting savings based on a rate of interest, projecting business revenues, knowing how costs will increase as the square footage of a building increases, and estimating future world populations based on known population growth rates are all possible once a pattern has been identified. Such relationships can be described in terms of what has changed and how it has changed.

Benchmarks. The high school graduate can:

1. Perform basic operations on algebraic expressions fluently and accurately:

1.1. Understand the properties of integer exponents and roots and apply these properties to simplify algebraic expressions.

Example: Simplify the expression

$$\left(\frac{a}{b}\right)^m \cdot c^m \text{ to obtain either } \frac{(ac)^m}{b^m} \text{ or } \left(\frac{ac}{b}\right)^m$$

1.3. Add, subtract, and multiply polynomials; divide a polynomial by a low-degree polynomial.

Example: Divide $x^3 - 8$ by $x - 2$ to obtain $x^2 + 2x + 4$; divide $x^4 - 5x^3 - 2x$ by x^2 to obtain $x^2 - 5x - \frac{2}{x}$.

1.4. Factor polynomials by removing the greatest common factor; factor quadratic polynomials.

1.5. Add, subtract, multiply, divide, and simplify rational expressions.

Example: Express $\frac{1}{x} + \frac{1}{y}$ as a single fraction to obtain $\frac{x+y}{xy}$.

1.6. Evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified values of their variables.

2. Understand functions, their representations, and their properties:

2.1. Recognize whether a relationship given in symbolic or graphical form is a function.

2.3. Understand functional notation and evaluate a function at a specified point in its domain.

3. Apply basic algebraic operations to solve equations and inequalities:

3.1. Solve linear equations and inequalities in one variable including those involving the absolute value of a linear function.

Example: A pipe is to be cut to a length of 5 meters accurate to within a tenth of a centimeter. Recognize that an acceptable length x (in meters) of the pipes satisfies the inequality $|x-5| \leq 0.001$.

3.2. Solve an equation involving several variables for one variable in terms of the others.

Example: If C represents the temperature in degrees Celsius and F represents the temperature in degrees Fahrenheit, then $C = \frac{5}{9}(F - 32)$. Solve this equation for F to obtain $F = \frac{9}{5}C + 32$.

3.3. Solve systems of two linear equations in two variables.

3.5. Solve quadratic equations in one variable.

Example: Solve $x^2 - x - 6 = 0$ by recognizing that $x^2 - x - 6 = (x-3)(x+2)$ can be factored to obtain the two solutions $x = 3$ and $x = -2$.

4. Graph a variety of equations and inequalities in two variables, demonstrate understanding of the relationships between the algebraic properties of an equation and the geometric properties of its graph, and interpret a graph:

4.1. Graph a linear equation and demonstrate that it has a constant rate of change.

4.2. Understand the relationship between the coefficients of a linear equation and the slope and x - and y -intercepts of its graph.

4.3. Understand the relationship between a solution of a system of two linear equations in two variables and the graphs of the corresponding lines.

4.4. Graph the solution set of a linear inequality and identify whether the solution set is an open or a closed half-plane; graph the solution set of a system of two or three linear inequalities.

Example: Graph the solution set of the system of linear inequalities:

$$\begin{aligned} 2x + y &\leq 4 \\ x &\geq 1. \end{aligned}$$

4.5. Graph a quadratic function and understand the relationship between its real zeros and the x -intercepts of its graph.

4.7. Graph exponential functions and identify their key characteristics.

(Continued on page 40)

BENCHMARKS

(Continued from page 21)

Example: Graph the exponential function $y(x) = 2^x$. Recognize that $y(x+1)$ is twice as large as $y(x)$ since $y(x+1) = 2^{x+1} = 2 \cdot 2^x = 2 \cdot y(x)$.

4.8. Read information and draw conclusions from graphs; identify properties of a graph that provide useful information about the original problem.

5. Solve problems by converting the verbal information given into an appropriate mathematical model involving equations or systems of equations; apply appropriate mathematical techniques to analyze these mathematical models; and interpret the solution obtained in written form using appropriate units of measurement:

5.1. Recognize and solve problems that can be modeled using a linear equation in one variable, such as time/rate/distance problems, percentage increase or decrease problems, and ratio and proportion problems.

5.2. Recognize and solve problems that can be modeled using a system of two equations in two variables, such as mixture problems.

Example: A chemist has available two solutions of acid. The first solution contains 12% acid, and the second solution contains 20% acid. He wants to mix the two solutions to obtain a 500-milliliter mixture containing 15% acid. How many milliliters of each solution should he mix?

5.3. Recognize and solve problems that can be modeled using a quadratic equation, such as the motion of an object under the force of gravity.

Example: A stone is dropped off a cliff 660 feet above the ground. When will the stone hit the ground if its height in feet at time t seconds after it is dropped is given by $h(t) = 660 - 16 \cdot t^2$?

5.4. Recognize and solve problems that can be modeled using an exponential function, such as compound interest problems.

5.6. Recognize and solve problems that can be modeled using a finite geometric series, such as home mortgage problems and other compound interest problems.

Example: How much money will you have in a retirement fund if you deposit \$1,000 each year for 20 years and the interest rate remains constant at 4%?

Incremental Steps Will Bring the Benchmarks Within Reach

What will it take to make the high school diploma signify readiness for college or a good job in the high-performance job sector? First, state policymakers need to anchor high school graduation requirements and assessments to the standards of the real world: to the knowledge and skills that colleges and these employers actually expect if young people are to succeed in their institutions. In return, colleges and employers need to start honoring and rewarding student achievement on state standards-based assessments by using these performance data in their admissions, placement, and hiring practices. Although most states have worked hard in the last 10 years to raise the quality of academic standards and the rigor of assessments, the ADP benchmarks may seem even more demanding. For example, no state currently requires all students to take Algebra II to graduate, and few high school exit tests measure much of what ADP suggests that students need to know. In some cases, the knowledge and skills in the benchmarks are not sampled at all on state tests. Incorporating ADP benchmarks into state education systems is a long-term agenda, and progress will be measured by incremental steps rather than radical shifts. State education and business leaders must devise strategies that build on, rather than discard, ongoing standards-based reforms; that sensibly ratchet up the rigor of standards, assessments, and course-taking requirements over time; and that blend them into a coherent system of requirements for earning a high school diploma that signifies college and workplace readiness. □

Sample Postsecondary Assignment in Introductory Chemistry

Introductory chemistry at Ball State University, a moderately selective institution in Muncie, Ind., (with average SAT scores around 1050) that offers both associate's and bachelor's degrees, challenges students to interpret, manipulate, process, and present quantitative information accurately and present solutions in the appropriate unit of measure or dimension. Students must have a solid foundation in mathematics in order to concentrate on learning chemistry. In this sample, students are being taught about the ideal gas law, but they are not being taught the algebra involved in applying that law; to succeed in this course, they must have learned all the necessary mathematics in high school. In the following assignment, students must have mastered algebra benchmarks 1.5 and 5, as well as language benchmark 7.

Use formulas such as the ideal gas law ($P \cdot V = nR \cdot T$) to calculate unknown quantities such as pressure, temperature, volume, molar mass, density, or molecular formula.

Problem: What is the temperature of 0.520 mol of argon gas that occupies 4.25 L at 750 torr?

Solution: Use the ideal gas law: $PV = nRT$. Solve the ideal gas law for T , and substitute the known information.

$$T = \frac{PV}{nR} = \frac{(750.0 \text{ torr})(1 \text{ atm}/760 \text{ torr})(4.25 \text{ L})}{(0.520 \text{ mol})(0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1})} = 98 \text{ K}$$

IT'S TIME TO TELL THE KIDS

(Continued from page 15)

are developing high school exit exams. But in many states the high school exit exams were developed to assess minimum competence. So every year many students pass a high school exit exam, but then do poorly on a college placement exam and end up in remedial courses. According to a recent study that compared 66 state high school exams (35 in English and 31 in mathematics) to a set of standards for university success found that just three of them (all in English) could offer useful information about students' preparation for college (Conley, 2003).

In 2000, Kentucky became the first state in the nation to pass a state law creating an online mathematics assessment developed specifically to let high school sophomores and juniors know if they are ready for college-level algebra and calculus. Called the Kentucky Early Mathematics Testing Program (KEMTP), the test assesses Algebra I, Geometry, and Algebra II and was developed by high school and college mathematics teachers from Kentucky. This purely diagnostic assessment does not become part of the high school transcript and is not used for admissions to college; it does give students (and their schools) immediate feedback on which topics they have—and have not—mastered and urges students to use the one to two years they have left in high school to address those weaknesses. (To learn more about KEMTP, go to www.mathclass.org/welcome-kemtp.htm.)

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3) High schools should clear up the misconceptions. Counselors are the front line here, and they'll need a lot of support. All school personnel should be well-armed with the facts and encouraged to convey them to students. And the facts are clear: High school performance matters. Hard work in high school matters. Doing homework matters. Taking rigorous courses matters. Getting good grades matters. All of these are closely connected to whether students succeed in college. (And, interestingly, they're also closely connected to whether non-college bound students succeed in their jobs.) High schools should also make sure students are well informed about college remedial courses, specifically: These are the courses they will be enrolled in if their high school work is not up to snuff; these courses do not bear college credit; taking them amounts to paying for an education that could have been had for free in high school; and students who have to take several of them almost never reach college graduation. (The sidebar on page 11 is a student-friendly fact sheet on the importance of high school achievement for college.)

4) High schools should serve college- and work-bound students equally well. Teachers, counselors, and administrators dream of students working hard, doing well in school, and graduating from college. It is a wonderful dream—but that doesn't mean it is in every student's best interest. Those who haven't done well academically and those whose interests are not in the liberal arts are best served with an honest look at their current chances in college and a serious examination of the alternatives, such as training opportunities and job placement assistance. The fact is, despite the economy's growing preference for college degrees, there are many good jobs available to high school graduates. (For more information on the importance of high school for the non-college bound, see the sidebar on page 13.) Postponing college is also a viable option. Many students enter college when they are older, often after several years of work. More than half of the students in two-year colleges are older than 24, and about one-quarter of them are over 35 (NCES 1999). Their age and employment may give them the experience to make better course choices, the maturity to be more disciplined students, skills that will help them pass some courses, and perhaps even employer-paid tuition benefits.

Too often, we think students' problems are inside of them, and we blame students' poor motivation. However, most students tend to be motivated if they see incentives for effort. But in the case of high school performance, we obscure what is at stake for most students. While top quartile students (those aiming for highly selective colleges) are told the incentives for better grades and test scores, the vast majority of students get the impression that high school achievement, grades, and test scores are irrelevant.

Students must realize that high school grades are important: Grades strongly predict future careers. There are strong incentives for school effort and students can improve their adult attainments by improving their high school grades. Al-

though most colleges are not selective—and most unselective colleges (and most employers) ignore grades in selecting applicants—even unselective colleges and employers discover that youths with better high school grades are more successful in attaining college degrees and higher earnings.

The American educational system has taken a bold step in making college accessible to so many students. However, the revolution is still incomplete, and research has identified a number of difficulties in educators', parents', and students' understandings of college and what it requires. This revolution poses new challenges and a set of unintended consequences. We will need thoughtful solutions to address them. □

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LETTERS

(Continued from page 3)

plaud our physics teachers and marvel at their understanding of the forces at work in the world, but what would the competitive market pay for an excellent K-3 teacher?

These are arguably the most important teachers in education. Let us remember that future prison populations are based on how many students fail elementary reading classes, not on how many have failed physics or secondary math. These teachers are equally deserving of competitive pay. In industry there is no demand for primary grade teachers, so how should their pay scale be developed?

In industry, people seek advanced degrees to earn greater responsibility within the firm and greater pay. In this sense, education is no different. But in industry, the employer can control the factors that lead to the success or failure of a product. The firm controls inputs, processing time, and can quantifiably measure its outcome to see that quality standards are maintained. Educators do not have that option. The single greatest contributor to a child's academic achievement is the home environment (Coleman, 1966). Merit pay for teachers, which Miller is trying to push us to, does not affect this input.

Miller contends that inner city teachers deserve more pay. Maybe, but not merit pay.

—KEITH NEWMAN
Morrison Elementary
Philadelphia, Penn.

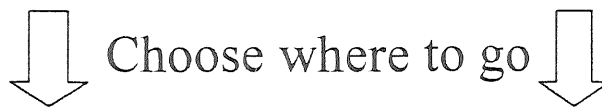
Matthew Miller responds:

Mr. Spicher is right that suburban districts may raise salaries in response to my high-poverty teacher pay initiative, and it's possible that in some areas this would diminish the impact of my proposal. But my conversations with many teachers persuade me that so long as the absolute salary levels and salary trajectory available for excellent teachers in high-

(Continued on page 44)

Get to the 6 Year Plan Site!!

1. Double click Internet Explorer.
2. Click Favorites tab.
3. Scroll down Favorites tab and click on 6 Year Plan.



BRIDGES

1. *CLICK PLANNING FOR HIGH SCHOOL. (NEAR TOP)*
2. *CLICK BRIDGES PICTURE.*
3. *USER NAME: 0030319*
4. *PASSWORD: knights (all lower case)*

i could be

1. Click *i* could be

MCIS

1. CLICK ON THE GROUP OF KIDS
2. USER NAME: *0030319*
3. PASSWORD: *knights (all lower case)*
4. PICK TOPIC ON LEFT

Your own 6 Year Plan web page

1. Click on My Six Year Plan (Guy with the Diploma)
2. Enter your own User Name and Password
3. Don't have a User Name and Password?
Mr. Alexander will get you one!

Find this site from any computer... www.6yearplan.spps.org



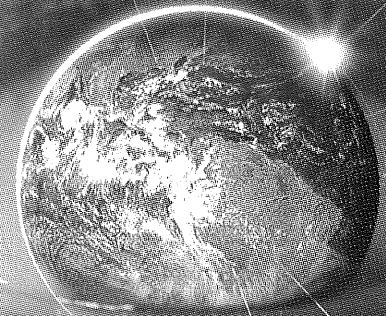
**Questions or comments
about the Six Year Plan website?**

Contact your student's school counselor
or the project coordinator, Dan LaBore,
at **651.767.8316** or **Dan.LaBore@spps.org**

Sponsored by the Connected Counseling Project
through a generous grant from the Bush Foundation



Live Tomorrow What You Dream Today!



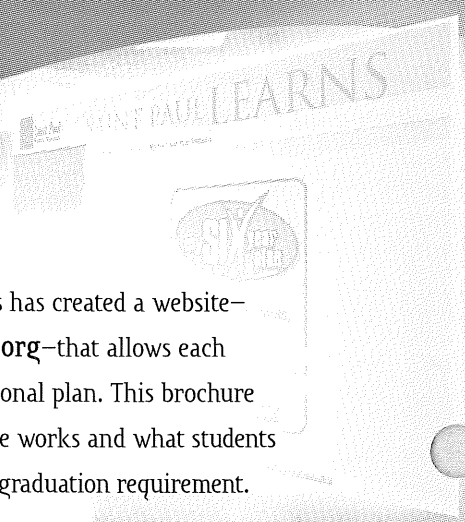
*I'm interested in the future
because I'm going to spend the rest of my life there.*



dream today



Students are supposed to **dream**—of their future, of what they want to do and be after high school. Such dreaming strengthens the connections between what they learn today and how they live tomorrow. Beginning with the Class of 2008, all students graduating from Saint Paul Public Schools will design a six-year plan that includes four years of high school and at least two years beyond. The plan encourages them to focus on educational goals and career options, opening up a world of opportunities.



Saint Paul Public Schools has created a website—www.6yearplan.spps.org—that allows each student to develop a personal plan. This brochure describes how the website works and what students must do to complete this graduation requirement.

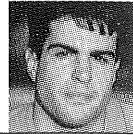
www.6yearplan.spps.org

goals



We have identified several goals for the website:

- Motivate students to associate career and life planning
- Create a culture of high aspirations
- Provide students with a tool to help design a six-year plan
- Increase the number of students who connect what they are doing in high school with their future
- Increase graduation rates for all students
- Increase the number of students who go on to higher education after high school
- Increase each student's knowledge of career options
- Increase the number of students who have achievable individual career plans
- Increase the congruence between career plans and the courses students take
- Increase stakeholders' involvement with students

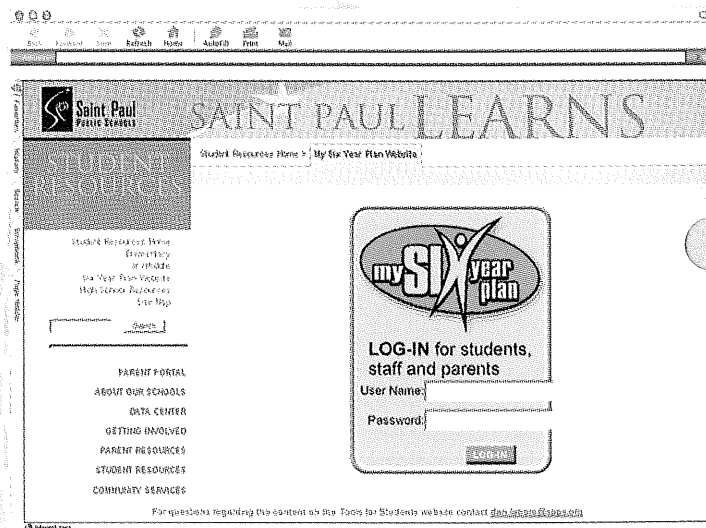


using the website

The website has two components. My Six Year Plan contains eight steps students go through to develop a vision for their future. Tools offer students help in using the site and additional resources for completing the plan.

my six year plan

Students in grade 9 will receive a user name and password from their high school that will allow them to access their personal Six Year Plan site. They will also receive instructions on how to use the site. The site is password protected so only students can enter data. To ensure security, school staff and parents can view a student's Six Year Plan, but others must have permission. School staff can make comments about the content of each student's Six Year Plan for the student to see, and the student can reply. Comments will appear on the printout of the plan.



Students follow eight steps to complete a personal plan.

1. Proposed High School Class Schedule:

Students plan the classes they are going to take during all four years of high school. Changes can be made at any time. An official class history will be added in the future.

2. About Me:

Students answer general questions that will enable staff and parents to get to know students better. New entries can be added whenever needed.

3. Credits

Students keep track of their progress toward meeting graduation requirements and make plans to make up classes they still need or didn't pass.

4. Test Results

Students can store the results of tests they must take or could take during high school. They can also list the tests they need to take in the future. Required tests such as Basic Skills will be automatically listed in the future.

5. Post High School Plans

Students develop a work-in-progress plan for their future, beginning with a vision and ending with a specific plan to implement in their senior year.

6. Efolio (optional)

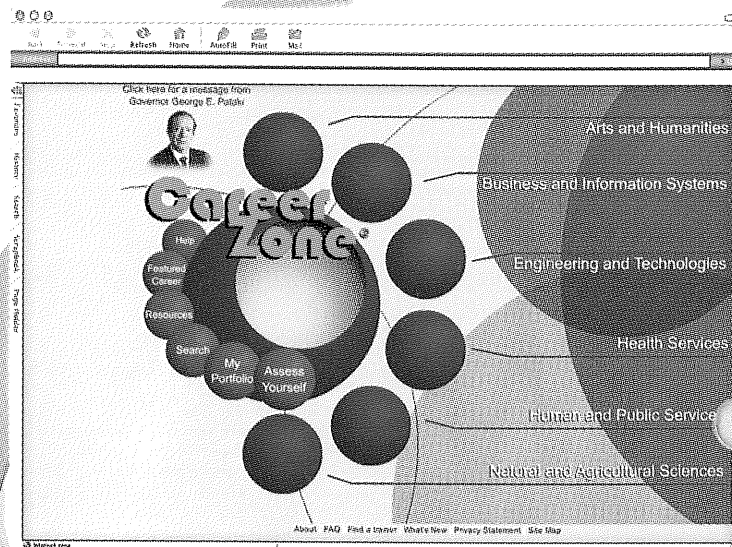
Students can publish their site's web address for others to view their portfolio. Schools that are using Efolio will provide the training needed.

7. Check-off Page

Students keep track of the things they need to do prior to graduation.

8. Print

Students print out their six-year plan.



In order for students to meet the minimum requirement for graduation they should complete the items listed on the Check-off Page in their Six Year Plan. School staff will verify completion at various intervals. The Six Year Plan was designed to meet National Career Development Standards in the areas of self-knowledge, educational and occupational exploration, and career planning.

tools



The website also contains a variety of useful tools to help students use the site as well as plan for their future. Go to the home page (www.6yearplan.spps.org), where there are two links across the top, Planning for High School and Planning for After High School.

Planning for High School gives students access to information on: Self Help, Post-secondary Enrollment Options (PSEO), HS Links, Bridges, Multicultural Excellence Program (MEP) Link, Career Cruising Demo, and Help. Each section starts with an explanatory page to help students navigate.

Planning for After High School provides information about a number of different resources such as the Minnesota Career Information System (MCIS), Career Info, Fin Aid, Resumes, College Info and Efolio. Related websites are included at the bottom of each page. Clicking on pictures will also take students to interesting sites.

6 T H A N N U A L

STUDENT ACADEMIC

C O N F E R E N C E

CONFERENCE PROGRAM & ABSTRACTS



Wednesday, April 14, 2004

Comstock Memorial Union
Minnesota State University Moorhead

Volume VI

*The MSUM showcase of
Academic Achievement*

www.mnstate.edu/acadconf

MINNESOTA STATE UNIVERSITY
moorhead

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Purpose

The purpose of the Student Academic Conference is to showcase the work and talent of MSUM students through presentations, posters, and creative works at a one-day conference held annually at MSUM in April in the Comstock Memorial Union. All students are encouraged to submit presentation applications. We strive to accommodate all students who wish to be presenters. Parents, friends, prospective students, alumni, employers and the university community are welcome to attend the conference to witness the excitement of intellectual exchanges among our students.

Sponsors

This conference exists because of the work of the entire university community, both in terms of financial and moral support. Supporters include: Strategic Grant Initiatives Fund, President's Office, Academic Affairs, Student Affairs, Administrative Affairs, Alumni Foundation, Inter Faculty Organization, MSUAASF, AFSCME, Student Senate, Campus Activities Board, Student Activities Budget Committee, and Sodexo Services.

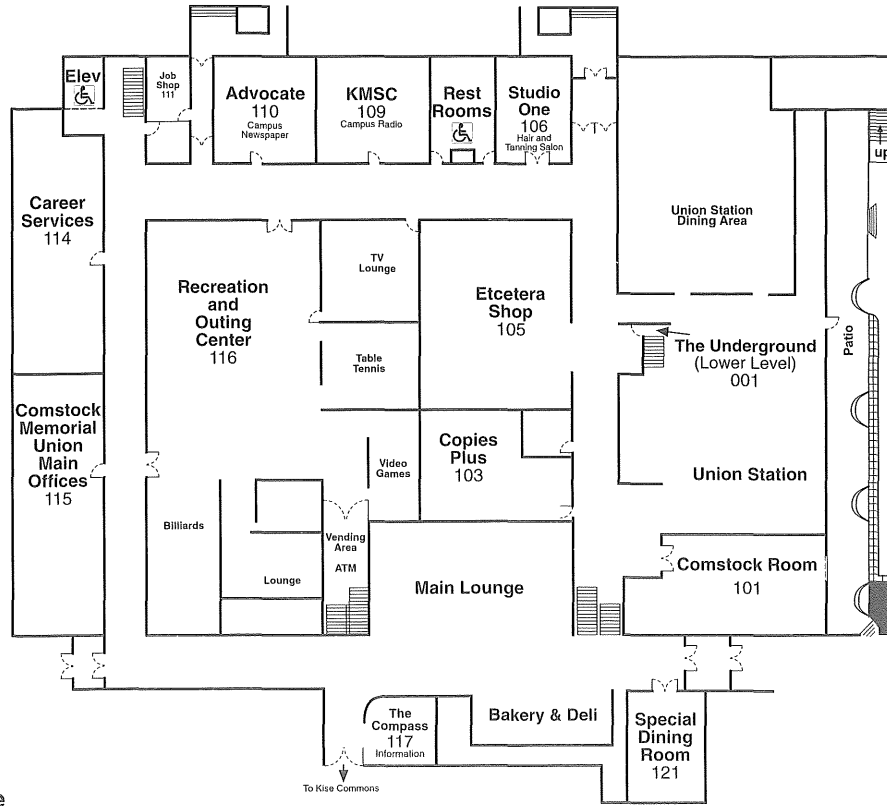
Comstock Memorial Union Map



Comstock Memorial Union

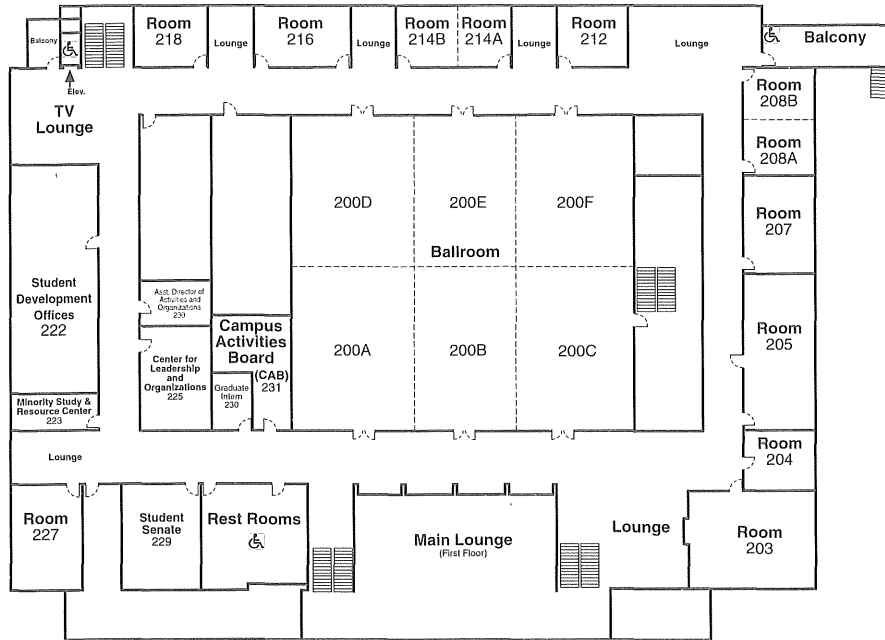


First Floor



= You Are Here

Second Floor

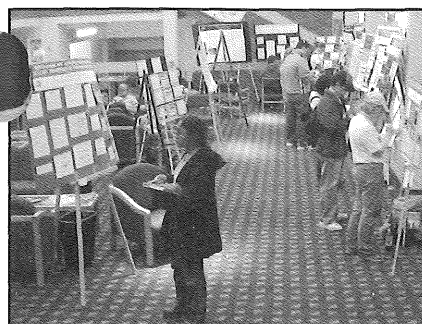
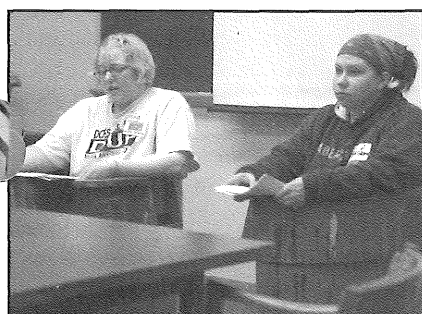
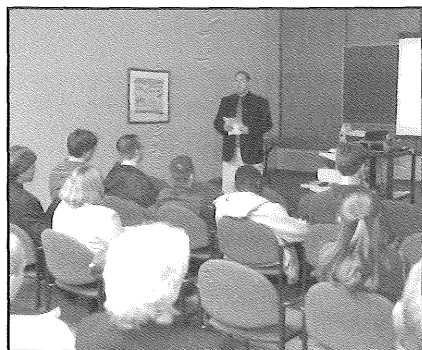


Comstock Memorial Union is a smoke-free environment

How the Conference got Started

Conference Highlights

2004	139 Presentations / 253 Presenters
2003	156 Presentations / 258 Presenters
2002	151 Presentations / 234 Presenters
2001	133 Presentations / 241 Presenters
2000	139 Presentations / 218 Presenters
1999	107 Presentations / 170 Presenters



Minnesota State University Moorhead has developed a program to encourage undergraduate research in all disciplines through the development of the Student Academic Conference. The idea of such a conference was suggested by Dr. Andrew Conteh, Political Science, during a class in spring semester of 1998 when he said, "few students have the opportunity to present at national or regional conferences." This got MSUM graduate student Ryan Sylvester thinking, and he went back to Dr. Conteh proposing that the Student Academic Conference be started. The two of them met frequently over the summer to plan and outline the mission and concept of the conference.

The two initiated meetings with the President, Vice Presidents, and Academic Deans to request support. The conference was well-supported financially and in spirit. With the endorsement of administration, the conference planners developed a list of faculty and staff from across campus representing every discipline and division and invited them to be part of the Student Academic Conference steering committee.

The conference format includes a luncheon for presenters featuring an MSUM alumnus keynote speaker on the topic of undergraduate research. The keynote is followed by a panel response composed of four undergraduate students who are selected by each academic Dean to represent their respective division (Arts & Humanities, Education & Human Services, Business & Industry, and Social & Natural Sciences). Following the luncheon there are two or three presentation sessions of approximately an hour and half each in length. Most presentations in a session are 17 minutes in length (12 minutes to present and 5 minutes for questions) but accommodations are made for specific time requests such as 30, 45, or even 60 minute workshops or panel discussions. There are 15 break-out rooms used for simultaneous presentations so attendees have to determine ahead of time which presentations they wish to attend. Throughout the conference, poster presentations are on display in the main lobby area where the conference is held.

Dr. Conteh remains the primary conference organizer with the assistance of students, various campus personnel and the advice of the two steering committees.

Applications to present are made available during fall semester and are due in mid-February. The conference strives to feature presentations from all academic majors across campus and to allow any student to participate. Applications are screened by the Program sub-group of the steering committee. Presentations are grouped loosely by common themes, but careful attention is paid to ensure sessions are not homogenous. This is done to promote the conference theme of sharing ideas across disciplines. The way presentations are scheduled presents attendees with the opportunity to hear multiple presentations from different disciplines within a session. Every attempt is made to accommodate audio visual requests of presenters.

There is no fee for the presenters. Presenters have the opportunity to attend the conference luncheon (at no cost) featuring the keynote speaker and student panelists. Funding for the conference has come from across campus in the past (Alumni Foundation, Academic Departments, Academic Deans, Vice Presidents, President) but, recently, the conference applied for a Strategic Initiative Grant and will operate off of the grant for another year. The conference will then be added to the regular budget of the university. The major costs to the conference are the conference luncheon for presenters, printing of the conference program with presentation abstracts, and funding for travel and hosting of the keynote speaker. Additional costs include: certificates, conference posters, conference information postcards, name tags, and other printing costs. The total per year has been less than \$4,000, but with increased participation, costs have increased each year.

Conference planners are now preparing for the 7th Student Academic Conference to be held in April 2005. Each year has seen progressive positive involvement from presenters, faculty, staff, and attendance at the conference.

Letter from the President



Greetings:

At Minnesota State University Moorhead, our students develop into proficient scholars and artists as evidenced by the annual MSUM Student Academic Conference.

This conference highlights student work inspired by the involvement and encouragement of our faculty. Essentially all of the research papers, creative works, group projects, and other student presentations are created under the personal supervision of an involved faculty mentor. Personal interaction between MSUM students and faculty is instrumental to high achievement by both.

Students who participate in the Student Academic Conference experience the intellectual pleasure of presenting to a genuinely interested audience of other students, faculty, and members of the community. In addition, they face the challenge of defending their ideas in a supportive community of student and faculty scholars. Such experiences only strengthen the undergraduate learning experience.

Congratulations to all who contribute to the conference as student participants, faculty mentors, conference planners, and supporters. Thank you for your role in continuing Minnesota State University Moorhead's mission to foster excellence in teaching and learning.

Sincerely,



Roland E. Barden, Ph.D.
President

Letter from the Vice President of Academic Affairs

Conference Participants:

There are so many reasons that the Minnesota State University *Student Academic Conference* became a tradition after its initial offering. Student learning and excellent faculty teaching are what we are about, and nothing is more appropriate for us to celebrate than student achievements in scholarship, research, and creative activity.

It seems that more and more attention is focused on institutional collaborations and partnerships. In that context, it is so important always to remember that the most significant collaboration is between student and teacher, learner and mentor. Today, we all have the opportunity to learn from the results of so many truly special partnerships.

As you make your selections and visit the poster sessions, be certain to ask the student presenters questions about what they have accomplished and what each envisions the next step to be. Also, please take time to thank the faculty mentors for their efforts – without them the rewarding day you have ahead of you would never have happened.

Yours truly,



Bette Midgarden
Vice President

Letter from the Vice President of Student Affairs

Welcome!

The Student Academic Conference provides an excellent opportunity to bridge the classroom experience with the out of class learning environment. The "laboratories" that exist on campus through services, residence halls, leadership programs, employment, student activities, and organization involvement are there to complement what is learned in the classroom. These experiences are rich with opportunity for students to apply what has been taught in the classroom and can assist in developing students in a variety of meaningful ways. The participation in the Conference can bring all facets of learning together in an inspiring and informative experience for all, whether presenting or reviewing the hard work of others. Thank you for taking the time to be involved and in making the MSUM campus a place where academic and student success can flourish.



Letter from the President of the Student Senate

Salutations,

Higher education provides individuals with countless opportunities to develop socially and intellectually, but rarely are these individuals allowed to professionally demonstrate this development prior to graduation. Committed to excellence, Minnesota State University Moorhead guarantees every student the right to showcase their skills at the annual academic conference.

Students who participate in the academic conference receive due recognition for hard work, but perhaps more importantly, they learn to communicate their ideas and thoughts to peers. An individual may possess the greatest ideas in the world, but if they are unable to effectively communicate, the greatness will be lost in translation.

Each and every student participating in the academic conference is certain to learn and grow from the experience. It is precisely this above and beyond learning ethic that makes the students participating in this event some of the best on campus.

In closing, I applaud all participating students for your continued dedication to academics and taking advantage of this great opportunity to showcase your skills.

Sincerely,

Travis Maier
President, Student Senate

Letter from the President of IFO

Metamorphoses are no less remarkable for being frequent, and one of those routine miracles is the process that changes a former high school student into a poised, thoughtful professional. The Student Academic Conference both recognizes and celebrates the transformation. While ultimately students educate themselves, faculty are still there to nudge, cajole, instruct and sometimes even inspire them. Events like the Conference give us the pleasure of watching our students make us proud.



Cindy Phillips
President, MSUM Inter Faculty Organization

Letter from the President of Alumni Foundation

Dear Future Alumni,

The mission of the Minnesota State University Moorhead Alumni Foundation is to develop relationships and provide funding to advance academic excellence.

It is truly a pleasure for the Alumni Foundation to support students like you who exemplify academic excellence. Knowledge is exciting, but it becomes even more powerful when shared with others. Your willingness to present the results of scholarly activity speaks well of your commitment to a lifetime of learning.

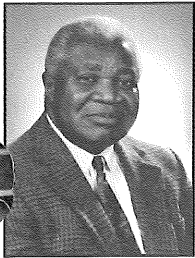
You are accomplished students. I know that you will become successful alumni.

Sincerely,

Mark Vanyo
President, MSUM Alumni Foundation

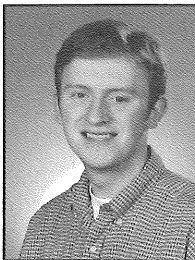
- 7:30 a.m. Poster Set-Up—Registration/Information Table—CMU Main Lounge**
- 10:30 a.m. Presenter Registration—Registration/Information Table—CMU Main Lounge**
- 11:15 a.m. Seating for the Luncheon—CMU Ballroom**
- 11:30 a.m. Luncheon Starts (Welcome and Introductions)—CMU Ballroom**
Menu: Grilled Chicken Fettuccini Alfredo [Chicken] or Grilled Portabella Mushroom Alfredo [Vegetarian]
Luncheon is for presenters and invited guests. Tickets can be purchased by sending an e-mail to aconf@mnstate.edu noting your meal choice by 04/03/2004. Tickets are \$6.50. Individuals can attend the presentation portion of the luncheon without purchasing luncheon tickets.
- 11:50 a.m. Keynote Speaker—CMU Ballroom**
Mr. Thomas C. Proehl
Managing Director, Guthrie Theater, Minneapolis, MN.
- 12:20 p.m. Student Panelists—CMU Ballroom**
Chris Hames, Education & Human Services
Ben Hanson, Arts & Humanities
Heidi Petersen, Business & Industry
Stephanie Corneliussen, Social & Natural Sciences
- 1:00 p.m. Presentation Session 1 and Poster Session 1—
Various CMU Rooms and Poster Display Area**
- 2:20 p.m. Break**
- 2:30 p.m. Presentation Session 2 and Poster Session 2—
Various CMU Rooms and Poster Display Area**
- 4:00 p.m. Closing Social —CMU Main Lounge**
Refreshments sponsored by Counseling and Career Services.
Presenters should attend to pick up their conference certificate.

Conference Organizers And Steering Committee



Conference Advisor

Dr. Andrew Conteh
Professor of Political Science



Conference Organizers

Jan Krasny
*Student Organizer,
Residence Life Department*



Linda Palmer
Student Organizer



Cindy Preston
*Assistant to the Vice President
for Academic Affairs for
Special Projects*

Steering Committee

Andrew Conteh	Political Science
Layne Anderson	Comstock Memorial Union
Theresa Carson	Communication Studies, Film Studies, and Theatre Arts
David Olday	Sociology & Criminal Justice
Helen Sheumaker	American Multicultural Studies & Humanities
Harry Weisenberger	Education Foundations
Gregory Stutes	Economics
Cynthia Preston	Academic Affairs
Dean Palmer	OAS Intermediate
Steven Bolduc	Economics
Yahya Fredrickson	New Center
Judy Peterson	Alumni Foundation
Oh-Hee Lee	Elementary and Early Childhood
Lian Ng	Mathematics
Ruth Marie Newton	Elementary and Early Childhood
Linda Palmer	Student
Jan Krasny	Student

Conference Volunteers

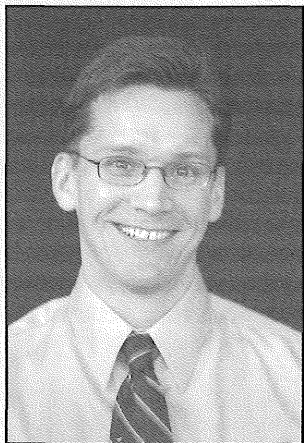
Angela Boser, Barb Seiler, Barbara Rath, Becky Boyle, Betty Gunderson, Brian Smith, Britt Tatman Ferguson, Brittney Goodman, Bruce Roberts, Carol Sibley, Chris Chastain, Cliff Schuette, Craig Ellingson, Cristina Mitrovici, Dave Olday, David Crockett, Dawn Hammerschmidt, Deb Lewis, Diane Wolter, Elizabeth Evenson, Ellen Brisch, Greg Stutes, Greg Toutges, Harry Weisenberger, Henry Chan, Jane Gudmundson, Janet Haak Aarness, Jean Hollaar, Jim Hatzenbuhler, Joe Provost, John Benson, Karen Mehnert-Meland, Karl W. Leonard, Kathryn Wise, Kathy Scott, Kevin Carollo, Konrad Czynski, Kris Benson, Kristi Alverson, Larry Schwartz, Laurie Blunsom, Layne Anderson, Linda Winkler, Marie Swanson, Phyllis May-Machunda, Roland Barden, Sandi Schuette, Sandy Pearce, Shawn Dunkirk, Shirlee Holland, Stephen Giedosh, Steve Bolduc, SuEllen Shaw, Theresa Carson

Want to Get Involved?

If you are interested in being a part of the steering committee for the Student Academic Conference next year, a conference volunteer, or interested in being a student organizer, please send an e-mail expressing your interest to aconf@mnstate.edu

Keynote: ***"Giving Back:
A Question of Responsibility
Enhancing Community"***

Each year an MSUM alumnus is selected to deliver the keynote address to conference attendants. This person is selected by the conference steering committee following a review of nominations received from members of the MSUM campus community. This year's keynote speaker is:

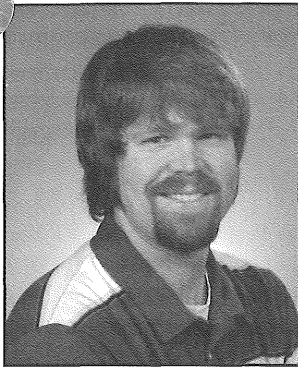


Thomas C. Proehl
Managing Director

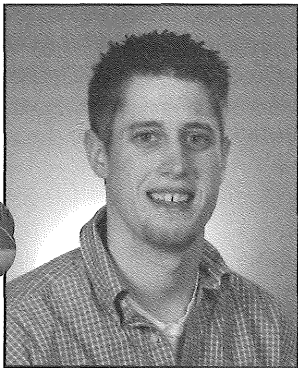
Having served as Guthrie Theater general manager for the past four years, Tom Proehl was named managing director in March 2003. He began his career at the Guthrie Theater as box office reservationist in 1984 prior to working for the La Jolla Playhouse and later moving to New York City in 1987. While in New York, Proehl held management positions with Playwrights Horizons, The Dramatists Guild, and Theatre for a New Audience. Before returning to Minneapolis he served as founding managing director of New York's Signature Theatre Company, collaborating with artistic director James Houghton and producing seasons of works by playwrights Lee Blessing, Edward Albee, Horton Foote, Adrienne Kennedy, Sam Shepard, Arthur Miller and John Guare. Mr. Proehl received his BA in Theatre from Minnesota State University, Moorhead and was recently awarded an outstanding alumni award. He received his MFA in Arts Administration from CUNY/Brooklyn College where he also served as an adjunct lecturer. Mr. Proehl continues to advise numerous New York based theater companies including The Foundry Theatre, Cherry Lane Theatre, SoHo Repertory Theatre and Signature Theatre Company. Tom also serves on the Executive Committee of the League of Resident Theatres and on the Board of Directors of The Playwrights' Center.

Student Panelists

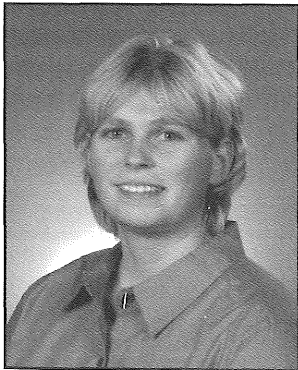
Each year four student panelists are selected to respond to the keynote address. These four students represent the four academic divisions of the university: Arts & Humanities, Social & Natural Sciences, Business & Industry, and Education & Human Services. These students are selected by the Dean of each academic division following a review of nominations received from members of the MSUM campus community. This year's panelists include:



Ben Hanson has been a student at MSUM for only two years. He completed his freshman year 2001-2002 at St. John's University in Collegeville, MN. In 2002 he decided to return home to where he grew up to attend MSUM and become an English/Mass Communications major. Ben is in his junior year at MSUM, but plans on attending the University of Alaska in Anchorage next fall through the National Student Exchange program. He hopes to experience a fresh perspective on life and learning through this amazing opportunity to live and study in a new and different culture. This experience will complement his studies here at MSUM greatly. Ben has worked at the local Fargo-Moorhead YMCA for the past four years in various positions. He started off as a camp counselor and waterfront director for Camp Cormorant, and he currently coaches the youth swim team, working with ages 6-18. Ben enjoys working with kids of all ages, entertaining those around him and generally being the most hilarious person he knows.



Chris Hames will be graduating this May with a bachelor degree in social work. He is a member of Phi Kappa Phi, the national interdisciplinary honor society, as well as other departmental organizations. He has most recently won an award for Outstanding Student Contribution for his work with the People Escaping Poverty Project. This service-learning award is given annually to one student within the four-college area. He is currently enjoying an internship at MeritCare hospital, and hopes to gain further experience in the field before attending graduate school. His passions lie in social research and he has aided professors during summer months with their independent studies. His interest in social work was stirred after an extensive motorcycle trip throughout the country of Mexico. Though the motorcycle now lies in pieces near the border of Guatemala, he will always remember the trip as a life-changing experience.



Heidi Petersen an accounting and economics major, has been an active student at MSUM since her freshman year. As a freshman and sophomore, she was actively involved in her respective Hall Councils and became a member of the Resident's Conduct Committee and Dining Service Committee. As a sophomore, she was President of Alpha Lambda Delta (ALD), a sophomore Honor Society, and Treasurer of SPURS, a volunteer organization. In 2002, she became involved with the Student Activities Budget Committee (SABC), and believes it is a committee where she can make the most difference for all MSUM students. Last fall, Heidi was elected President of the Financial Management Association of which she has been a member for two years. She also serves on the University Budget and Planning Committee. Through her campus involvement, Heidi has augmented her education with invaluable real world experiences that make her a better overall student at MSUM.



Stephanie Cornelius is a senior psychology major. She plans to attend graduate school this fall to pursue a doctorate in clinical psychology. Stephanie is a member of Psi Chi, the National Honor Society in Psychology. She currently works as a research assistant at the Neuropsychiatric Research Institute in Fargo. Stephanie is a non-traditional student. She earned a B.S. degree in Mass Communications (journalism emphasis) in 1981, and worked as a professional journalist for over 20 years. Most of her journalism education was completed at Moorhead State University. She frequently wrote about social and psychological issues, and finally decided to become a psychologist (instead of always interviewing them). Stephanie is married, has two children, and lives in Hawley.

SCHEDULE BY ROOM

• CMU 101

Session 1

1:00 pm	7	An Economic Study Of Household Income
1:20 pm	10	Parent-Child Communication Program: Case Study #10
1:40 pm	17	The Scots are not English: Understanding Contemporary Scottish Identity
2:00 pm	22	Solutions to Meinong's Theory of Objects

Session 2

2:30 pm	18	Student Voices Through Poetry, Music and the Visual Arts: Responses to an Alternative Education Service Learning Project
2:50 pm	38	Commercial Banking: Nationally and Locally
3:10 pm	71	Deadly Diseases Among Us

• CMU 121

Session 1

1:00 pm	140	China's One Child Policy: The Changing Face of Family Planning
1:20 pm	127	Sports Economics
1:40 pm	124	Signature Quilt
2:00 pm	133	Women's Empowerment

Session 2

2:30 pm	113	Reproductive Ecology of Fathead Minnows (<i>Pimephales promelas</i>): The Effect of Nest Type on Reproductive Success
2:50 pm	111	Digital Manipulation, Has it Gone Too Far?
3:10 pm	103	Fraud in the United Way
3:30 pm	92	Early Fraternal Organizations of Clay County

• CMU 200A

Session 1

1:00 pm	5	Theatre of the Absurd
1:20 pm	53	Breathing, How it Works!

Session 2

2:30 pm	105	Stars and Stuff: an Introduction to Astrophysics
3:20 pm	110	Mental Retardation
3:40 pm	31	Greek Theatre

• CMU 200C

Session 2

2:30 pm	108	Portrait Drawing Demonstrations: Methods and Meanings
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• CMU 200D

Session 1

1:00 pm	84	Sri Lanka: Facts about the Culture, Life style, Education, Civil War and Terrorism
2:00 pm	30	Commedia Dell'arte

Session 2

2:30 pm	136	Shakespearean Theatre
2:50 pm	28	Alike, but not the Same: A Lesson on Human Genetic Variation.

Numbers correspond with abstract listings beginning on page 28

• **CMU 203**

Session 1

- 1:00 pm 23 The Parent-Child Communication Program: Case Study #9
1:20 pm 98 Advanced Optical Imaging-Experiences at Looking Through the World With Different Lenses (objectives).
1:40 pm 100 Constitutionality of the USA PATRIOT ACT
2:00 pm 114 The Wine Industry

Session 2

- 2:30 pm 116 Fraud: How to Make a Million Stealing from Your Employer
2:50 pm 119 Parent-Child Communication Program
3:10 pm 35 Extensions of Synthetic Division

• **CMU 205**

Session 1

- 1:00 pm 1 Some Multiplication Tricks
1:45 pm 16 Being Genderqueer in a Binary Gender System: A Discussion About Gender

Session 2

- 2:30 pm 88 Parent-Child Communication Program Case Study #2
2:50 pm 3 Isabella and Bolinda Tuylendina
3:10 pm 4 Multiplication Made Easy

• **CMU 207**

Session 1

- 1:00 pm 34 Keith Haring: Success and Controversy in Mass Exposure
1:20 pm 27 Ethics: An Imperative Part of Any Business
1:40 pm The Influence of Self-Generated Hand Gestures on Recall
2:00 pm 48 The Parent-Child Communication Program, Case Study #8

Session 2

- 2:30 pm 57 The Correlation of the Proportion of Errors between Staggered Spondaic Word and SCAN-C tests
2:50 pm 65 A Look at the Changing Music Industry from an Economic Perspective
3:10 pm 123 The Implications of Selective Abortion in the Case of Disability: Integrating Disability Right and Reproductive Freedom
3:30 pm 79 Racism and MSUM

• **CMU 208**

Session 1

- 1:00 pm 8 The Parent-Child Communication Program: Case Study #7
1:20 pm 32 Comparison of teacher certification procedures in U.S.A. and Russia
1:40 pm 41 Small Group Decision Making
2:00 pm 68 The Malady of Fibromyalgia

Session 2

- 2:30 pm 72 Relating the Biological, Ecological and Societal Values in Order to Bring Attention to the Overall Importance of Virgin Prairie Land to Our Region and Nation as a Whole.
2:50 pm 76 The Determinants of Homeownership in the United States of America
3:10 pm 82 Parent-Child-Communication-Program Case Study #10
3:30 pm 87 Clay County Italian Immigration: Italian Influence on Local Beauty Industry

• **CMU 214**

Session 1

- 1:00 pm 139 Child Labor
1:20 pm 135 Gender Differences in Physical, Verbal, and Social Bullying of Elementary Students
1:40 pm 106 Vetoing the Engenderment of the Frozen Human Embryo: A Feminist Argument for the Regulation of Reproductive Technologies and the Abolition of Forced Motherhood
2:00 pm 102 Target: Upscale Discounting and Power Relationships

Session 2

- 2:30 pm 85 Parent-Child Communication Program: Case Study #1
2:50 pm 75 Anti-Germanism in Clay County
3:10 pm 42 Portfolio Assessment of Young Children
3:30 pm 39 Is Casino Gambling Profitable to the State?

• **CMU 216**

Session 1

- 1:00 pm 26 Parent-Child Communication Program (PCCP) - Case Study #4
1:20 pm 78 Language Disorders: The Elements and Instituting a Classroom Model.
1:40 pm 89 The Recent Changes in the Immigration and Asylum System of the United Kingdom and Their Detrimental Effects
2:00 pm 90 Predictions in Daily Lives - Can They Be Justified?

Session 2

- 2:30 pm 93 Web Research: Advertising, Public Relations-Marketing, News, Television, and Radio Online
2:50 pm 95 Investigating DNA Replication Origins in *C. elegans*.
3:10 pm 99 The United States Beer Industry
3:30 pm 109 NMR Study of Magnetic Molecules

• **CMU 218**

Session 1

- 1:00 pm 43 The Parent-Child Communication Program: Case Study #5
1:20 pm 91 Developmental and Behavioral Ontogeny of Antipredator Behavior in Cichlid Larvae
1:45 pm 132 Spectroscopy and the Spectroscope

Session 2

- 2:30 pm 14 Nonny's Flair: An Examination of a Children's Book Illustrator.
3:00 pm 19 Loving the Tummy
3:30 pm 36 Shakespeare's Tragedies and Histories

• **CMU 227**

Session 1

- 1:00 pm 138 Marxism, Revolution, and Reform
1:20 pm 134 Colorful History of Moorhead School: Oak Port.
1:40 pm 129 Genocide and the Normality of the Perpetrators of Evil
2:00 pm 128 Racing Through Time: A Historical Look at Horses in Clay County

Session 2

- 2:30 pm 126 French Settlement in Clay County
2:50 pm 125 Cost/Benefit Analysis of a Twins stadium in Minneapolis
3:10 pm 120 The role of NHE1 in Balb-c rat tumorigenesis
3:30 pm 117 Expression of Mitochondrial Genes in Wheat (*Triticum aestivum* L.)

• **Kise Line D**

Session 1

- 1:00 pm 13 Topics in the American Renaissance
 2:05 pm 52 Phospholipase D Regulates Stress Fiber Formations By Phenylephrine Stimulation in CCL39 cells

Session 2

- 2:30 pm 29 A Lesson in Genetic Probability
 3:30 pm 74 The Rise of Korean Nationalism Leading Up to the Samil

Underground

Session 1

- 1:00 pm 112 Form Follows Function: Why Animals Look the Way They Do

Session 2

- 2:30 pm 121 Rape as a Weapon of War: Reproductive Issues Concerning Women in War

• **Main Lounge**

Session 1

- 1:00 pm 44 Chemical Characterization of Ostariophysan Alarm Substance
 1:00 pm 37 Mental Illness and Inmates
 1:00 pm 33 Aseptic Technique
 1:00 pm 2 Guided Notes in Mathematics Classes
 1:00 pm 6 The Social Problem of Battered Women
 1:00 pm 45 Children's Literature - A cooperative study
 1:00 pm 9 Assessing the Function of PPDK in C3 Plants Using Arabidopsis thaliana TDNA Gene Knockouts
 1:00 pm 58 Effect of Environmental Stresses on Corn Root Respiration
 1:00 pm 21 Mary Crowdog/"Lakota Woman"
 1:00 pm 15 Providing Health Care in Nicaragua: Nursing Student's Experience
 1:00 pm 24 Are you interested in becoming a Certified Nursing Assistant?
 1:00 pm 25 Cell Cycle Genes and Their Effects on Mitochondrial Inheritance and Dynamics
 1:00 pm 12 Orchid Habitat in Northern Minnesota
 1:00 pm 61 Short-Term Effects of Removing Energy (sucrose) Supply to Growing Corn Roots.
 1:00 pm 55 A Glimpse Into the World of a Systems Analyst
 1:00 pm 59 Can corn root respiration be stimulated by pre-treating corn roots in iron fertilizer?
 1:00 pm 46 Investigation of a Novel Method to Purify Plasmid DNA
 1:00 pm 56 An Initial Biochemical Analysis of Autism
 1:00 pm 54 Is Mitochondrial Inheritance Tissue Specific? A New Look at the mtDNA Dogma from a Cell Biology Perspective.
 1:00 pm 51 How Do First-Syllable Characteristics Affect Visual Word Recognition of Long Words?
 1:00 pm 11 Intravenous Catheters Used in the Intensive Care Unit
 1:00 pm 50 Phospholipase D Regulates Stress Fiber Formation By Phenylephrine Stimulation in CCL39 cells
 1:00 pm 49 The Changing Face of St. Francis de Sales
 1:00 pm 47 The Influence of Prayer and Religious Beliefs on Measures of Life Satisfaction
 1:00 pm 60 Do Elevated Levels of Potassium Ion in the External Medium of Corn Roots Stimulate Respiration and Therefore ATP Synthesis?

Session 2

- 2:30 pm 94 How do MAPK/ERK Kinases Regulate Microtubule Spindle Formation?
2:30 pm 137 Special Problem in Education: Reaching Out to Adopted Minorities
2:30 pm 131 NMR Line Widths as a Signature of Crystal Geometry and Dynamics.
2:30 pm 130 Rates of Groundwater Cadmium Attenuation in Gravels Impregnated with Glacial Clay in the Red River Valley
- 2:30 pm 122 Growth Curve of Staphylococcus Epidermidis
2:30 pm 118 The Conversion of MDH to LDH Through Site Directed Mutagenesis
2:30 pm 115 Mothers and Unfair Pre-Natal Care.
2:30 pm 107 A Test of the Anti-Pathogen Hypothesis for the Function of Perciform Club Cells
2:30 pm 104 Can Some Predators Avoid Being Chemically Labeled by Their Prey?
2:30 pm 101 The Car Problem; Whether to Buy or Lease.
2:30 pm 69 Genetic Diversity Influencing Survival Among Declining Populations of Black-tailed Prairie Dogs.
2:30 pm 96 Phenylephrine Activates Na⁺-H⁺ Exchangers via Bifurcating Pathways Involving RhoA and ERK as Downstream Effects of Different Protein Kinase C Isoforms
- 2:30 pm 62 Effect of Aluminum Ion on Corn Root Respiration
2:30 pm 86 Modeling of Upper-Level Degrees Earned Among Different Races
2:30 pm 83 Seeing the Unseen with Geophysical Methods
2:30 pm 81 Nocturnal Behavioral Response to Chemical Alarm Cues by Tetra Fish
2:30 pm 80 Comparison of Growth Rates and Survival of Painted Turtles (*Chrysemys picta*) in Clay County, Minnesota
- 2:30 pm 77 Designing Physical Anthropology Labs: An Exercise in Active Learning
2:30 pm 73 Green Fluorescent Protein Purification and Polyclonal Antibody Production in Rabbits
2:30 pm 70 Effects of Oxidative Stress on *Saccharomyces cerevisiae* FKH1 Transcription Factor Knockout
2:30 pm 67 The Role of PKC in RhoA Activation and Stress Fiber Formation
2:30 pm 66 Cohabitation and Divorce
2:30 pm 64 The Relationship of Root Cell Membranes "Leakiness" on Root Tissue Respiration Rate
2:30 pm 63 Survey of Wild Turkey (*Meleagris gallopavo*) Distribution in Cass and Clay Counties
2:30 pm 97 Exploring the Roles of Nurse Practitioner in Rural Health Care

Alphabetical List Of Presenters

Last Name	First Name	Presentation Title	Room	Time
Ahonen	Adam	18 Student Voices Through Poetry, Music and the Visual Arts: Responses to an Alternative Education Service Learning Project	101	2:30 pm
Alemadi	Shireen	113 Reproductive Ecology of Fathead Minnows (<i>Pimephales promelas</i>): The Effect of Nest Type on Reproductive Success	121	2:30 pm
Alemadi	Shireen	107 A Test of the Anti-Pathogen Hypothesis for the Function of Perciform Club Cells	Main Lounge	2:30 pm
Alles	Amal	84 Sri Lanka: Facts about the Culture, Life style, Education, Civil War and Terrorism	200D	1:00 pm
Almer	Marin	57 The Correlation of the Proportion of Errors between Staggered Spondaic Word and SCAN-C tests	207	2:30 pm
Al-Rifai	Moneer	109 NMR Study of Magnetic Molecules	216	3:30 pm
Anania	Amanda	46 Investigation of a Novel Method to Purify Plasmid DNA	Main Lounge	1:00 pm
Andel	Chad	7 An Economic Study Of Household Income	101	1:00 pm
Andersen	Rachel	75 Anti-Germanism in Clay County	214	2:50 pm
Anderson	Leah	23 The Parent-Child Communication Program: Case Study #9	203	1:00 pm
Anderson	Amber	13 Topics in the American Renaissance	Kise Line D	1:00 pm
Baukol	Angela	41 Small Group Decision Making	208	1:40 pm
Beer	Melissa	83 Seeing the Unseen with Geophysical Methods	Main Lounge	2:30 pm
Bengtson	Jennifer	77 Designing Physical Anthropology Labs: An Exercise in Active Learning	Main Lounge	2:30 pm
Bentley	Vusya	134 Colorful History of Moorhead School: Oak Port.	227	1:20 pm
Bentz	Kristin	103 Fraud in the United Way	121	3:10 pm
Bichler	Christian	101 The Car Problem; Whether to Buy or Lease.	Main Lounge	2:30 pm
Blaeser	Alissa	136 Shakespearean Theatre	200D	2:30 pm
Boyd	Amber	75 Anti-Germanism in Clay County	214	2:50 pm
Boyer	Andrea	14 Nonny's Flair: An Examination of a Children's Book Illustrator.	218	2:30 pm
Breikjern	Nicholle	18 Student Voices Through Poetry, Music and the Visual Arts: Responses to an Alternative Education Service Learning Project	101	2:30 pm
Burgad	Derick	73 Green Fluorescent Protein Purification and Polyclonal Antibody Production in Rabbits	Main Lounge	2:30 pm

Numbers correspond with abstract listings beginning on page 28

Last Name	First Name	Presentation Title	Room	Time
Burnside	Tabitha	67 The Role of PKC in RhoA Activation and Stress Fiber Formation	Main Lounge	2:30 pm
Butler	Devin	13 Topics in the American Renaissance	Kise Line D	1:00 pm
Byklum	Tami	15 Providing Health Care in Nicaragua: Nursing Student's Experience	Main Lounge	1:00 pm
Charles	Lang	18 Student Voices Through Poetry, Music and the Visual Arts: Responses to an Alternative Education Service Learning Project	101	2:30 pm
Christianson	Sarah	17 The Scots are Not English: Understanding Contemporary Scottish Identity	101	1:40 pm
Church	Kinsey	14 Nonny's Flair: An Examination of a Children's Book Illustrator.	218	2:30 pm
Collins	Ashley	37 Mental Illness and Inmates	Main Lounge	1:00 pm
Colquhoun	Thomas	64 The Relationship of Root Cell Membranes "Leakiness" on Root Tissue Respiration Rate	Main Lounge	2:30 pm
Cook	Trevor	126 French Settlement in Clay County	227	2:30 pm
Cooper	Adriane	71 Deadly Diseases Among Us	101	3:10 pm
Cotton	Rose	57 The Correlation of the Proportion of Errors between Staggered Spondaic Word and SCAN-C tests	207	2:30 pm
Cox	Jesse	60 Do Elevated Levels of Potassium Ion in the External Medium of Corn Roots Stimulate Respiration and Therefore ATP Synthesis?	Main Lounge	1:00 pm
Crabtree	Shannon	121 Rape as a Weapon of War: Reproductive Issues Concerning Women in War	Undersground	2:30 pm
Crabtree	Shannon	123 The Implications of Selective Abortion in the Case of Disability: Integrating Disability Right and Reproductive Freedom	207	3:10 pm
Dahl	Faith	70 Effects of Oxidative Stress on <i>Saccharomyces cerevisiae</i> FKH1 Transcription Factor Knockout	Main Lounge	2:30 pm
Daley	Brittany	13 Topics in the American Renaissance	Kise Line D	1:00 pm
Denker	James	118 The Conversion of MDH to LDH Through Site Directed Mutagenesis	Main Lounge	2:30 pm
Deutsch	Tiffany	93 Web Research: Advertising, Public Relations-Marketing, News, Television, and Radio Online	216	2:30 pm
Dinnel	Autumn	25 Cell Cycle Genes and Their Effects on Mitochondrial Inheritance and Dynamics	Main Lounge	1:00 pm
Dollerschell	Mark	1 Some Multiplication Tricks	205	1:00 pm
Donner	Jeni	104 Can Some Predators Avoid Being Chemically Labeled by Their Prey?	Main Lounge	2:30 pm

Numbers correspond with abstract listings beginning on page 28

Last Name	First Name	Presentation Title	Room	Time
Drew	Shantell	81 Nocturnal Behavioral Response to Chemical Alarm Cues by Tetra Fish	Main Lounge	2:30 pm
Duval	Matthew	67 The Role of PKC in RhoA Activation and Stress Fiber Formation	Main Lounge	2:30 pm
Easton	Amanda	13 Topics in the American Renaissance	Kise Line D	1:00 pm
Easton	Amanda	106 Vetoing the Engenderment of the Frozen Human Embryo	214	1:40 pm
Easton	Amanda	121 Rape as a Weapon of War: Reproductive Issues Concerning Women in War	Undersground	2:30 pm
Ehlers	Bethany	44 Chemical Characterization of Ostariophysan Alarm Substance	Main Lounge	1:00 pm
Elkin	Nicole Elkin	100 Constitutionality of the USA PATRIOT ACT	203	1:40 pm
Erik	Block	18 Student Voices Through Poetry, Music and the Visual Arts: Responses to an Alternative Education Service Learning Project	101	2:30 pm
Fanfulik	Lisa	119 Parent-Child Communication Program	203	2:50 pm
Feir	Dan	70 Effects of Oxidative Stress on <i>Saccharomyces cerevisiae</i> FKH1 Transcription Factor Knockout	Main Lounge	2:30 pm
Fick	Steven	30 Commedia Dell'arte	200D	2:00 pm
Finke	Tiffany	12 Orchid Habitat in Northern Minnesota	Main Lounge	1:00 pm
Flaat	Cole	136 Shakespearean Theatre	200D	2:30 pm
Flake	Shelley	13 Topics in the American Renaissance	Kise Line D	1:00 pm
Fohl	Michael	60 Do Elevated Levels of Potassium Ion in the External Medium of Corn Roots Stimulate Respiration and Therefore ATP Synthesis?	Main Lounge	1:00 pm
Foss	Nick	30 Commedia Dell'arte	200D	2:00 pm
Frank	Greta	30 Commedia Dell'arte	200D	2:00 pm
Frykman	Jon	112 Form Follows Function: Why Animals Look the Way They Do	Underground	1:00 pm
Frykman	Jon	62 Effect of Aluminum Ion on Corn Root Respiration	Main Lounge	2:30 pm
Funk	Shamus	86 Modeling of Upper-Level Degrees Earned Among Different Races	Main Lounge	2:30 pm
Gaa	Courtney	42 Portfolio Assessment of Young Children	214	3:10 pm
Gabel, Jr.	William	55 A Glimpse Into the World of a Systems Analyst	Main Lounge	1:00 pm
Geray	Katie	63 Survey of Wild Turkey (<i>Meleagris gallopavo</i>) Distribution in Cass and Clay Counties	Main Lounge	2:30 pm

Numbers correspond with abstract listings beginning on page 28

Last Name	First Name	Presentation Title	Room	Time
Gertsen	Lee	69 Genetic Diversity Influencing Survival Among Declining Populations of Black-tailed Prairie Dogs.	Main Lounge	2:30 pm
Gilleshammer	Lindsay	78 Language Disorders: The Elements and Instituting a Classroom Model.	216	1:20 pm
Glur	Darren	38 Commercial Banking: Nationally and Locally	101	2:50 pm
Gomez	Eric	13 Topics in the American Renaissance	Kise Line D	1:00 pm
Gomez	Eric	36 Shakespeare's Tragedies and Histories	218	3:30 pm
Goonawardena	Roshani	84 Sri Lanka: Facts about the Culture, Life style, Education, Civil War and Terrorism	200D	1:00 pm
Goonewardena	Roshani	82 Parent-Child-Communication-Program Case Study #10	208	3:10 pm
Goos	Gwen	121 Rape as a Weapon of War: Reproductive Issues Concerning Women in War	Undersground	2:30 pm
Goos	Gwen	123 The Implications of Selective Abortion in the Case of Disability: Integrating Disability Right and Reproductive Freedom	207	3:10 pm
Grabowska	Sarah	40 The Influence of Self-Generated Hand Gestures on Recall	207	1:40 pm
Grawunder	Greg	113 Reproductive Ecology of Fathead Minnows (<i>Pimephales promelas</i>): The Effect of Nest Type on Reproductive Success	121	2:30 pm
Greenley	Jill	9 Assessing the Function of PPDK in C3 Plants Using <i>Arabidopsis thaliana</i> TDNA Gene Knockouts	Main Lounge	1:00 pm
Gruber	Natasha	63 Survey of Wild Turkey (<i>Meleagris gallopavo</i>) Distribution in Cass and Clay Counties	Main Lounge	2:30 pm
Gruber	Natash W.	80 Comparison of Growth Rates and Survival of Painted Turtles (<i>Chrysemys picta</i>) in Clay County, Minnesota	Main Lounge	2:30 pm
Guajardo	Pablo	79 Racism and MSUM	207	3:30 pm
Gubareva	Irina	32 Comparison of teacher certification procedures in U.S.A. and Russia	208	1:20 pm
Guiles	Pamela	13 Topics in the American Renaissance	Kise Line D	1:00 pm
Guthmiller	Michelle	23 The Parent-Child Communication Program: Case Study #9	203	1:00 pm
Hamann	Bree L.	91 Developmental and Behavioral Ontogeny of Antipredator Behavior in Cichlid Larvae	218	1:20 pm
Hannig	Melissa	42 Portfolio Assessment of Young Children	214	3:10 pm
Hanson	Amanda	62 Effect of Aluminum Ion on Corn Root Respiration	Main Lounge	2:30 pm
Hartung	Ashley	37 Mental Illness and Inmates	Main Lounge	1:00 pm

Numbers correspond with abstract listings beginning on page 28

Last Name	First Name	Presentation Title	Room	Time
Haugen	Inga	13 Topics in the American Renaissance	Kise Line D	1:00 pm
Haugen	Inga	36 Shakespeare's Tragedies and Histories	218	3:30 pm
Haverberg	Eric	105 Stars and Stuff: an Introduction to Astrophysics	200A	2:30 pm
Haynes	Angela	85 Parent-Child Communication Program: Case Study #1	214	2:30 pm
Heck	Jessica	95 Investigating DNA Replication Origins in <i>C. elegans</i> .	216	2:50 pm
Hendricks	Jacqueline	135 Gender Differences in Physical, Verbal, and Social Bullying of Elementary Students	214	1:20 pm
Hendrickson	Jodi	104 Can Some Predators Avoid Being Chemically Labeled by Their Prey?	Main Lounge	2:30 pm
Hendrickson	Jodi	58 Effect of Environmental Stresses on Corn Root Respiration	Main Lounge	1:00 pm
Herath	Shanaka	84 Sri Lanka: Facts about the Culture, Life style, Education, Civil War and Terrorism	200D	1:00 pm
Herman	James	132 Spectroscopy and the Spectroscope	218	1:45 pm
Hilton	Kristi	87 Clay County Italian Immigration: Italian Influence on Local Beauty Industry	208	3:30 pm
Hoepfner	Jennifer	13 Topics in the American Renaissance	Kise Line D	1:00 pm
Hoff	Amanda	26 Parent-Child Communication Program (PCCP) - Case Study #4	216	1:00 pm
Hohenstein	Janet	134 Colorful History of Moorhead School: Oak Port.	227	1:20 pm
Holmberg	Heidi	137 Special Problem in Education: Reaching Out to Adopted Minorities	Main Lounge	2:30 pm
Holzer	Chrissie	21 Mary Crowdog / "Lakota Woman"	Main Lounge	1:00 pm
Huber	Cassandra	10 Parent-Child Communication Program: Case Study #10	101	1:20 pm
Hugh	Emily	51 How Do First-Syllable Characteristics Affect Visual Word Recognition of Long Words?	Main Lounge	1:00 pm
Huseby	Nathan	28 Alike, but not the same: A lesson on human genetic variation.	200D	2:50 pm
Imdieke	Aimee	111 Digital Manipulation, Has it gone too Far?	121	2:50 pm
Jacobs	Sarah	43 The Parent-Child Communication Program: Case Study #5	218	1:00 pm
Jeske	Dustin	39 Is Casino Gambling Profitable to the State?	214	3:30 pm
Jetvig	Tessa	29 A Lesson in Genetic Probability	Kise Line D	2:30 pm
Jetvig	Tessa	61 Short-Term Effects of Removing Energy (sucrose) Supply to Growing Corn Roots.	Main Lounge	1:00 pm

Numbers correspond with abstract listings beginning on page 28

Last Name	First Name	Presentation Title	Room	Time
Jinadasa	Ludmi	82 Parent-Child-Communication-Program Case Study #10	208	3:10 pm
Jinadasa	Ludmi	84 Sri Lanka: Facts about the Culture, Life style, Education, Civil War and Terrorism	200D	1:00 pm
Jinadasa	Pat	84 Sri Lanka: Facts about the Culture, Life style, Education, Civil War and Terrorism	200D	1:00 pm
Johnson	Heidi	70 Effects of Oxidative Stress on Saccharomyces cerevisiae FKH1 Transcription Factor Knockout	Main Lounge	2:30 pm
Johnson	Jessica	50 Phospholipase D Regulates Stress Fiber Formation By Phenylephrine Stimulation in CCL39 cells	Main Lounge	1:00 pm
Johnson	Ann	86 Modeling of Upper-Level Degrees Earned Among Different Races	Main Lounge	2:30 pm
Johnson	Jessica	52 Phospholipase D Regulates Stress Fiber Formations By Phenylephrine Stimulation in CCL39 cells	Kise Line D	2:05 pm
Johnson	Lindsey	3 Isabella and Bolinda Tuylendina	205	2:50 pm
Jost	Gretchen	14 Nonny's Flair: An Examination of a Children's Book Illustrator.	218	2:30 pm
Kapsner	Katie	99 The United States Beer Industry	216	3:10 pm
Karunadharma	Pabalu	117 Expression of Mitochondrial Genes in Wheat (Triticum aestivum L.)	227	3:30 pm
Keisacker	Jessica	34 Keith Haring: Success and Controversy in Mass Exposure	207	1:00 pm
Keller	Chelsea	2 Guided Notes in Mathematics Classes	Main Lounge	1:00 pm
Kleffer	Holly	72 Relating the Biological, Ecological and Societal Values in Order to Bring Attention to the Overall Importance of Virgin Prairie Land to Our Region and Nation as a Whole.	208	2:30 pm
Kippen	Kadie	13 Topics in the American Renaissance	Kise Line D	1:00 pm
Kizima	Geniece	48 The Parent-Child Communication Program, Case Study #8	207	2:00 pm
Klassen	Tracy	119 Parent-Child Communication Program	203	2:50 pm
Kleindl	Jessica	97 Exploring the Roles of Nurse Practitioner in Rural Health Care	Main Lounge	2:30 pm
Knudson	Tanya	68 The Malady of Fibromyalgia	208	2:00 pm
Knutson	Julie	58 Effect of Environmental Stresses on Corn Root Respiration	Main Lounge	1:00 pm
Kock	Cindi	24 Are you interested in becoming a Certified Nursing Assistant?	Main Lounge	1:00 pm

Numbers correspond with abstract listings beginning on page 28

Last Name	First Name	Presentation Title	Room	Time
Kopel	Heidi	88 Parent-Child Communication Program Case Study #2	205	2:30 pm
Kubista	Shelly	42 Portfolio Assessment of Young Children	214	3:10 pm
Larson	Ryan	27 Ethics: An Imperative Part of Any Business	207	1:20 pm
Larson	Sara	9 Assessing the Function of PPK in C3 Plants Using Arabidopsis thaliana TDNA Gene Knockouts	Main Lounge	1:00 pm
Larson	Tom	28 Alike, but not the same: A lesson on human genetic variation.	200D	2:50 pm
Larson	Tom	59 Can corn root respiration be stimulated by pre-treating corn roots in iron fertilizer?	Main Lounge	1:00 pm
Lein	Christina	5 Theatre of the Absurd	200A	1:00 pm
Lembke	Candace	53 Breathing, How it Works!	200A	1:20 pm
Leopold	Carrie	58 Effect of Environmental Stresses on Corn Root Respiration	Main Lounge	1:00 pm
Levorsen	Alicia	73 Green Fluorescent Protein Purification and Polyclonal Antibody Production in Rabbits	Main Lounge	2:30 pm
Lhotka	Michele	130 Rates of Groundwater Cadmium Attenuation in Gravels Impregnated with Glacial Clay in the Red River Valley	Main Lounge	2:30 pm
Liberda	Chris	65 A Look at the Changing Music Industry from an Economic Perspective	207	2:50 pm
Lien	Tammy	25 Cell Cycle Genes and Their Effects on Mitochondrial Inheritance and Dynamics	Main Lounge	1:00 pm
Lindeman	Jennifer	108 Portrait Drawing Demonstrations: Methods and Meanings	200C	2:30 pm
Linstad	Jayne	101 The Car Problem; Whether to Buy or Lease.	Main Lounge	2:30 pm
Lipp	Amanda	73 Green Fluorescent Protein Purification and Polyclonal Antibody Production in Rabbits	Main Lounge	2:30 pm
Lisa	Streitz	54 Is Mitochondrial Inheritance Tissue Specific? A New Look at the mtDNA Dogma from a Cell Biology Perspective.	Main Lounge	1:00 pm
Lof	Kay	15 Providing Health Care in Nicaragua: Nursing Student's Experience	Main Lounge	1:00 pm
Mastel	Tracy	63 Survey of Wild Turkey (Meleagris gallopavo) Distribution in Cass and Clay Counties	Main Lounge	2:30 pm
Mastel	Tracy	69 Genetic Diversity Influencing Survival Among Declining Populations of Black-tailed Prairie Dogs.	Main Lounge	2:30 pm
Matteson	Ben	31 Greek Theatre	200A	3:40 pm

Numbers correspond with abstract listings beginning on page 28

Last Name	First Name	Presentation Title	Room	Time
Mau	Jen	43 The Parent-Child Communication Program: Case Study #5	218	1:00 pm
McCamant	Virginia	71 Deadly Diseases Among Us	101	3:10 pm
McColley	Patrick	5 Theatre of the Absurd	200A	1:00 pm
McCoy	Austin	98 Advanced Optical Imaging-Experiences at looking through the world with different lenses (objectives).	203	1:20 pm
McCracken	Amanda	83 Seeing the Unseen with Geophysical Methods	Main Lounge	2:30 pm
Medhus	Jared	93 Web Research: Advertising, Public Relations-Marketing, News, Television, and Radio Online	216	2:30 pm
Meier	Kierston	13 Topics in the American Renaissance	Kise Line D	1:00 pm
Metcalf	Alison	67 The Role of PKC in RhoA Activation and Stress Fiber Formation	Main Lounge	2:30 pm
Mies	Julie	4 Multiplication Made Easy	205	3:10 pm
Mikelson	Valerie	108 Portrait Drawing Demonstrations: Methods and Meanings	200C	2:30 pm
Mische	Hannah	124 Signature Quilt	121	1:40 pm
Mishra	Anusha	96 Phenylephrine Activates Na ⁺ -H ⁺ Exchangers via Bifurcating Pathways Involving RhoA and	Main Lounge	2:30 pm
Pfeifer	Kate	61 Short-Term Effects of Removing Energy (sucrose) Supply to Growing Corn Roots.	Main Lounge	1:00 pm
Pfeifer	Kate	29 A Lesson in Genetic Probability	Kise Line D	2:30 pm
Plattner	Alycia	55 A Glimpse Into the World of a Systems Analyst	Main Lounge	1:00 pm
Pudil	Samantha	136 Shakespearean Theatre	200D	2:30 pm
Quade	Katie	42 Portfolio Assessment of Young Children	214	3:10 pm
Rajapakse	Pushpakantha	84 Sri Lanka: Facts about the Culture, Life style, Education, Civil War and Terrorism	200D	1:00 pm
Ranguma	Sonnia	122 Growth Curve of Staphylococcus Epidermidis	Main Lounge	2:30 pm
Ranstrom	Lindsay	47 The Influence of Prayer and Religious Beliefs on Measures of Life Satisfaction	Main Lounge	1:00 pm
Reames	Cory	1 Some Multiplication Tricks	205	1:00 pm
Richgels	Erin	86 Modeling of Upper-Level Degrees Earned Among Different Races	Main Lounge	2:30 pm
Ringstrom	Bruce	129 Genocide and the Normality of the Perpetrators of Evil	227	1:40 pm
Roberson	Brianne	13 Topics in the American Renaissance	Kise Line D	1:00 pm

Numbers correspond with abstract listings beginning on page 28

Last Name	First Name	Presentation Title	Room	Time
Rodke	Stephanie	10 Parent-Child Communication Program: Case Study #10	101	1:20 pm
Ronderos	Dave S.	96 Phenylephrine Activates Na ⁺ -H ⁺ Exchangers via Bifurcating Pathways Involving RhoA and ERK as Downstream Effects of Different Protein Kinase C Isoforms	Main Lounge	2:30 pm
Roshau	Jessica	66 Cohabitation and Divorce	Main Lounge	2:30 pm
Rud	Courtney	104 Can Some Predators Avoid Being Chemically Labeled by Their Prey?	Main Lounge	2:30 pm
Rufsvold	Tracey	88 Parent-Child Communication Program Case Study #2	205	2:30 pm
Ruzicka	Amy	85 Parent-Child Communication Program: Case Study #1	214	2:30 pm
Rzaszutak	Mariya	71 Deadly Diseases Among Us	101	3:10 pm
Sandbek	Adam	102 Target: Upscale Discounting and Power Relationships	214	2:00 pm
Sander	James	92 Early Fraternal Organizations of Clay County	121	3:30 pm
Sanders	Meridith	114 The Wine Industry	203	2:00 pm
Sang	Rachel	50 Phospholipase D Regulates Stress Fiber Formation By Phenylephrine Stimulation in CCL39 cells	Main Lounge	1:00 pm
Sang	Rachel	52 Phospholipase D Regulates Stress Fiber Formations By Phenylephrine Stimulation in CCL39 cells	Kise Line D	2:05 pm
Santana	Castel	118 The Conversion of MDH to LDH Through Site Directed Mutagenesis	Main Lounge	2:30 pm
Sawarynski	Megan	131 NMR Line Widths as a Signature of Crystal Geometry and Dynamics.	Main Lounge	2:30 pm
Schmit	Joanna M.	80 Comparison of Growth Rates and Survival of Painted Turtles (<i>Chrysemys picta</i>) in Clay County, Minnesota	Main Lounge	2:30 pm
Semelis	Katie	108 Portrait Drawing Demonstrations: Methods and Meanings	200C	2:30 pm
Sherman	Brandon	140 China's One Child Policy: The Changing Face of Family Planning	121	1:00 pm
Shrestha	Binod	101 The Car Problem; Whether to Buy or Lease.	Main Lounge	2:30 pm
Shreve	Aaron	89 The Recent Changes in the Immigration and Asylum System of the United Kingdom and Their Detrimental Affects	216	1:40 pm
Simmons	Jindallay	124 Signature Quilt	121	1:40 pm

Last Name	First Name	Presentation	Title	Room	Time
Simms	Ava-Gaye	19	Loving the Tummy	218	3:00 pm
Simms	Ava-Gaye	94	How do MAPK/ERK Kinases Regulate Microtubule Spindle Formation?	Main Lounge	2:30 pm
Skjoiten	Kara	8	The Parent-Child Communication Program: Case Study #7	208	1:00 pm
Skolte	Jill	56	An Initial Biochemical Analysis of Autism	Main Lounge	1:00 pm
Sletten	Jessica	133	Women's Empowerment	121	2:00 pm
Smith	Sarah Jane	93	Web Research: Advertising, Public Relations-Marketing, News, Television, and Radio Online	216	2:30 pm
Smith	Rachael	112	Form Follows Function: Why Animals Look the Way They Do	Underground	1:00 pm
Splonskowski	Beth	87	Clay County Italian Immigration: Italian Influence on Local Beauty Industry	208	3:30 pm
Stanina	Jaynae	11	Intravenous Catheters Used in the Intensive Care Unit	Main Lounge	1:00 pm
Stein	Erika	115	Mothers and unfair pre-natal care.	Main Lounge	2:30 pm
Stinar	Kari	8	The Parent-Child Communication Program: Case Study #7	208	1:00 pm
Stroh	Julie	3	Isabella and Bolinda Tuylendina	205	2:50 pm
Takahashi	Mika	108	Portrait Drawing Demonstrations: Methods and Meanings	200C	2:30 pm
Teske	Rich	59	Can corn root respiration be stimulated by pre-treating corn roots in iron fertilizer?	Main Lounge	1:00 pm
Thompson	Andy	118	The Conversion of MDH to LDH Through Site Directed Mutagenesis	Main Lounge	2:30 pm
Thronson	Hillary	120	The role of NHE1 in Balb-c rat tumorigenesis	227	3:10 pm
Trautwein	Jessica	35	Extensions of Synthetic Division	203	3:10 pm
Tripathi	Virendra	90	Predictions in Daily Lives - Can They Be Justified?	216	2:00 pm
Tweed	Jeremy	127	Sports Economics	121	1:20 pm
Vave	Rebecca	74	The Rise of Korean Nationalism Leading Up to the Samil	Kise Line D	3:30 pm
Veslede	Heide	13	Topics in the American Renaissance	Kise Line D	1:00 pm
Villarreal	Angie	78	Language Disorders: The Elements and Instituting a Classroom Model.	216	1:20 pm
Wananu	Moses	56	An Initial Biochemical Analysis of Autism	Main Lounge	1:00 pm
Wasche	Rachel	101	The Car Problem; Whether to Buy or Lease.	Main Lounge	2:30 pm

Numbers correspond with abstract listings beginning on page 28

Last Name	First Name	Presentation Title	Room	Time
Weerasekara	Akila	94 How do MAPK/ERK Kinases Regulate Microtubule Spindle Formation?	Main Lounge	2:30 pm
West	Megan	31 Greek Theatre	200A	3:40 pm
Westerfield	Eli	16 Being Genderqueer in a Binary Gender System: A Discussion About Gender	205	1:45 pm
Wijesighe	Samadhi	84 Sri Lanka: Facts about the Culture, Life style, Education, Civil War and Terrorism	200D	1:00 pm
Wilder	Gina	13 Topics in the American Renaissance	Kise Line D	1:00 pm
Wittmier	Megan	49 The Changing Face of St.Francis de Sales	Main Lounge	1:00 pm
Zillgitt	Jessica	36 Shakespeare's Tragedies and Histories	218	3:30 pm
Zillgitt	Jessica	13 Topics in the American Renaissance	Kise Line D	1:00 pm

Abstracts

1

Title: Some Multiplication Tricks

Presenter(s): Mark Dollerschell, Cory Reames

Department: Mathematics

Advisor: Geok Ng

Abstract: A presentation of how to perform some multiplication without the use of calculators. The techniques learned can be applied to everyday situations.

2

Title: Guided Notes in Mathematics Classes

Presenter(s): Chelsea Keller

Department: Mathematics

Advisor: Kristine Montis

Abstract: I will be displaying a poster on guided notes in mathematics classes, and I will also be telling about and displaying information on my experience as a co-presenter at the RCML (Research Council on Mathematics Learning) Conference in Oklahoma City. The presentation that Dr. Kristine Montis and I will be doing at the RCML Conference is on guided notes as a means of success at the secondary and college levels.

3

Title: Isabella and Bolinda Tuylendina

Presenter(s): Lindsey Johnson, Julie Stroh, Danielle Peterson

Department: Education

Advisor: Brian Smith

Abstract: We have applied our knowledge of the human condition to twin first grade girls, applying major psychologists and their theories to the girls' lives and actions.

4

Title: Multiplication Made Easy

Presenter(s): Julie Mies, Andrea Mumm

Department: Mathematics

Advisor: Geok Ng

Abstract: Multiplication made easy by "tricks" or "shortcuts". Methods that are presented are functional and fast.

5

Title: Theatre of the Absurd

Presenter(s): Natalie Novacek, Christina Lein, Patrick McColley

Department: Theatre Arts

Advisor: Theresa Carson

Abstract: We will discuss the rise of absurdism and the important playwrights of the movement. We will also be performing 2 short scenes from absurdist plays.

6

Title: The Social Problem of Battered Women

Presenter(s): Kelly Nerby

Department: Sociology

Advisor: Sue Humphers-Ginther

Abstract: Woman battery is a social problem in our nation today although not many hear about it. It is a major cause of injury, disability, and death among American women, as among many world wide. In most cases today police officers refuse to arrest a man for beating his wife, and most courts refuse to prosecute them. Battery continues to exist because it reflects basic cultural and political forces in our society and around the world. What exactly are we teaching our kids who have to sit back and watch this violence in their own home? In the last decade we have made some advances in helping these women but there is still more that can be done. People need to know how they can help abused women to get out of the relationship safely, or if they themselves need help getting out.

7

Title: An Economic Study Of Household Income

Presenter(s): Chad Andel

Department: Economics

Advisor: Oscar Flores-Ibarra

Abstract: Using economic theory and regression analysis I will discuss how a college graduate's household income is expected to depend on chosen independent variables.

8

Title: The Parent-Child Communication Program: Case Study #7

Presenter(s): Kari Stinar, Kara Skjoiten

Department: SLHS

Advisor: Dr. Louis De Maio

Abstract: The study we conducted was one of twelve studies that analyzed the effect of the Parent-Child Communication Program on a mother with a child that has delayed language. Dr. Louis De Maio developed the Parent-Child Communication Program (PCCP) in 1998 to teach parents a method that will promote their child's communication and language. This study compared the mother's use of questions before and after the training program.

9

Title: Assessing the Function of PPKK in C3 Plants Using Arabidopsis thaliana TDNA Gene Knockouts

Presenter(s): Sara Larson, Jill Greenley

Department: Biology

Advisor: Chris Chastain

Abstract: Pyruvate, orthophosphate dikinase (PPDK) is an enzyme involved in the photosynthetic process of C4 plants. The function of PPKK in C3 plants has yet to be discovered. Here, we aim to determine whether PPKK plays a secondary role (not necessary for plant survival) or primary role (necessary for plant survival) in plant metabolism. Our hypothesis is if PPKK plays only a secondary role in plant metabolism, then Arabidopsis plants lacking PPKK may be able to survive and grow, although, illustrating an inferior phenotype with low vigor. We will test our hypothesis by obtaining plants that lack PPKK through using TDNA gene knockouts. Arabidopsis thaliana plants have been chosen for this study as they are an ideal C3 plant with available PPKK TDNA gene knockout lines. An ArabiPatch apparatus will be used to cultivate Arabidopsis plants. Leaf tissue will be extracted to determine if PPKK is present using Western blot analysis. Identified mutants will be cultivated in stressed environments. Failure to germinate will result in cultivation in nutrient-rich agar or the use of heterozygote plants.

10

Title: Parent-Child Communication Program: Case Study #10

Presenter(s): Cassandra Huber, Stephanie Rodke

Department: SLHS

Advisor: Louis De Maio

Abstract: The study we conducted was one of twelve that analyzed the effect of the Parent-Child Communication Program on a mother with a child that has delayed language. Dr. Louis De Maio developed the Parent-Child Communication Program (PCCP) in 1998 to teach parents a method that will promote their child's communication and language. This study compared the mother's use of questions before and after the training program.

11

Title: Intravenous Catheters Used in the Intensive Care Unit

Presenter(s): Jaynae Stanina

Department: Nursing

Advisor: Donna Heald

Abstract: I plan to research, plan, and present the different uses and styles of intravenous (IV) ports/catheters used on adults in the hospital setting on critical patients. The presentation will be posted on poster/bulletin board visual with detailed explanation of each port/catheter on pamphlets provided with the use of PowerPoint. As a nursing student obtaining my baccalaureate degree, I participated in a ninety-hour clinical preceptorship in an adult intensive care unit. During this time, I got to work first hand with patients who had a variety of IV catheters for various reasons. I would like the opportunity to be able to explain the different types of IV catheters and answer questions regarding the topic.

12

Title: Orchid Habitat in Northern Minnesota

Presenter(s): Tiffany Finke

Department: Anthropology/Earth Science

Advisor: Paul Sando

Abstract: My presentation will be based on information collected during a botany internship with the Minnesota DNR. The internship began in May 2003 and ended in August 2003. I used a Garmin GPS in the field and GIS Arcview software in the lab to create a GIS analysis of orchids found throughout northern Minnesota.

13

Title: Topics in the American Renaissance

Presenter(s): Amanda Easton, Brittany Daley, Amber Anderson, Devin Butler, Shelley Flake, Heide Veslede, Kierston Meier, Jennifer Hoepfner, Brianne Roberson, Jessica Zillgitt, Eric Gomez, Gina Wilder, Inga Haugen, Pamela Guiles, Kadie Kippen

Department: English

Advisor: Sheila Coghill

Abstract: This session will be a multiple-student presentation of a variety of topics students researched for their major course papers in English 322: (1) The American Renaissance. Topics include, but are not limited to: (1) The Ethos of Redemption Through Death: Paradigms and Parallels in Harriet Beecher Stowe's Uncle Tom's Cabin & Nathaniel Hawthorne's "Rappacini's Daughter" (2) "Like the Picture of Some Bright Angel Stopping to Reclaim a Sinner": Harriet Beecher Stowe's Use of Redemption to Reorganize Culture in Uncle Tom's Cabin (3) "Nevermore": Suffering in the Literature of Misery and the Creation of Literature of Isolation in Emily Dickinson's Poetry and Melville's Bartleby The Scrivener (4) Subverting Conventionality: Establishing Minority Identity in Frederick Douglass's The Meaning of the Fourth of July for the Negro and Harriet Beecher Stowe's Uncle Tom's Cabin (5) "Have You Ever Lost a Child?": The Power of Motherhood in Stowe's Uncle Tom's Cabin and Hawthorne's Scarlet Letter (6) Volcanoes, the Other and the Poetry of the Precipice: Emily Dickinson's and Walt Whitman's Poetry of Subversion (7) The Soul's Journey To Transformation By Way of Retreat: Emotion and Ratiocination in Susan Warner's Wide, Wide, World and Edgar Allen Poe's The Purloined Letter (8) "O, Had I the Wings of the Morning, I'd Fly Away to Cannan's Shore": Harriet Beecher Stowe's Subversion of the Sentimental Heroine Convention in Constructing Uncle Tom and Edgar Allen Poe's Characterization of Roderick Usher in The Fall of the House of Usher.

14

Title: Nanny's Flair: An Examination of a Children's Book Illustrator.

Presenter(s): Kinsey Church, Gretchen Jost, Andrea Boyer

Department: Elementary Education

Advisor: Carol Sibley

Abstract: Our slide show presentation examines the background of Nanny Hogrogian, a children's book illustrator. This includes an in-depth analysis of selected picture books, including those that have won the Caldecott Award.

15

Title: Providing Health Care in Nicaragua: Nursing Student's Experience"

Presenter(s): Tami Byklum, Kay Lof

Department: Nursing

Advisor: Jane Bergland

Abstract: Overview of health care in Nicaragua and our experiences as health care providers in this country.

16

Title: Being Genderqueer in a Binary Gender System: A Discussion About Gender

Presenter(s): Eli Westerfield

Department: Sociology

Advisor: Deb White

Abstract: In theory, transgender is a challenge to the social construction of gender. In practice, it usually is not. Transgendered people—in one way or another—place themselves outside the conventional female/male dichotomy. However, transgendered people live in a world that recognizes only female and male, a world where they have to be one or the other. People who live openly as transgendered still have gender attributions made about them by the casual passerby, even if they passerby has questions about the person's gender identity. This is because there is the belief that everyone can and must be classified as being either female or male. How can a self-identified transgendered/genderqueer person earn and maintain a transgender identity, when non-transgendered people feel the need to attribute a specific gender to that person?

17

Title: The Scots are Not English: Understanding Contemporary Scottish Identity

Presenter(s): Sarah Christianson

Department: History

Advisor: Margaret Sankey

Abstract: During a recent Independent Study in Scotland, I met many Scots that took offense at the slightest mention of anything related to England. I was determined to find out why. This presentation discusses some of the major historical events that helped to shape this aspect of contemporary Scottish identity.

18

Title: Student Voices Through Poetry, Music and the Visual Arts: Responses to an Alternative Education Service Learning Project

Presenter(s): Nicholle Breikjern, Adam Ahonen, Lang Charles, Block Erik

Department: Foundations of Ed

Advisor: Steve Grineski

Abstract: Students enrolled in Steve Grineski's Social Foundations of Education class complete a service learning project with students from the Red River Area Learning Center (RRALC). Over the course of the semester, these teacher education students participate in community-based recreational activities and provide academic tutoring with the RRALC students. As a culminating assignment, students prepare a project that responds to the alternative education experience and describe what they learned. Nicholle Breikjern will discuss an interview she conducted with a RRALC student and share a poster she created. Charles Lang will show a sculpture and talk about how it captures his ideas about alternative education, Erik Block will perform an original musical composition that reveals his thinking about the difficulties many alternative education students face and Adam Ahonen will share a piece of art and accompanying poem that highlights the importance of high teacher expectations for alternative education students.

19

Title: Loving the Tummy

Presenter(s): Ava-Gaye Simms

Department: MSUM Peer Health Educators

Advisor: Lynn Peterson

Abstract: This presentation aims to educate and to teach students that "Loving the Tummy" is an essential part of a healthy lifestyle. Students will learn that nutritional information is readily available and they will be enlightened on how to use these resources. In addition, students will be encouraged to think about what they eat through interactive games that place participants in realistic settings and require group participation. Students will see that eating healthy can be delicious and fun.

21

Title: Mary Crowdog/"Lakota Woman"

Presenter(s): Chrissie Holzer

Department: Center for Multidisciplinary Studies

Advisor: Yayha Frederickson

Abstract: The study of Multi-Cultural American Literature, with a poster presentation on Mary Crowdog and her published works "Lakota woman". Integrating traditional Native American art with passages from her book and information about her origins, it brings to life her struggles and accomplishments being a female American Indian in the United States.

22

Title: Solutions to Meinong's Theory of Objects

Presenter(s): Peter Montecuccio

Department: Philosophy

Advisor: Phil Mouch

Abstract: Alexius Meinong attempts to solve one of the major problems in the philosophy of language: the problem of negative existentials. This problem arises when we attempt to make meaningful statements about things which do not exist. For instance, the statement "Pegasus has wings" is a claim that there exists a thing such that it is Pegasus and it has wings. But since there is no such thing that exists and is Pegasus, and there has never been a thing such that it existed and was Pegasus, then how is it possible to mean anything by the statement? Meinong, however, attempts to solve this problem by positing different levels of existence. This theory has some very good insights into the problem of negative existentials, but he also runs into some serious problems. This presentation is an attempt to explicate how these existence levels work and to reconcile the problems Meinong faces in his theory. The goal is to demonstrate that Meinong's theory could work, thus allowing us to make meaningful statements about negative existentials.

23

Title: The Parent-Child Communication Program: Case Study #9

Presenter(s): Michelle Guthmiller, Leah Anderson

Department: Speech/Language/Hearing Sciences

Advisor: Louis De Maio

Abstract: Our study was one of twelve that analyzed the effect of the Parent-Child Communication Program on a mother with a child that has delayed language. Dr. Louis De Maio developed the Parent-Child Communication Program (PCCP) in 1998 to teach parents a method that will promote their child's communication and language. This study compared the mother's use of questions before and after the training program.

24

Title: Are you interested in becoming a Certified Nursing Assistant?

Presenter(s): Cindi Koch

Department: Nursing

Advisor: Donna Heald

Abstract: Offering a job opportunity that may promote a further interest in a nursing career. A 75 hour class could give good wages - to help pay tuition and possibly advance person into a health care field. CNA's are a vital part of Long Term Care and would benefit the community!

25

Title: Cell Cycle Genes and Their Effects on Mitochondrial Inheritance and Dynamics

Presenter(s): Tammy Lien, Autumn Dinnel

Department: Biology

Advisor: Ellen Brisch

Abstract: Mitochondria are responsible for cellular respiration. As they are essential for life, it is critical that they are transported from mother to daughter cell during division. Previous research has shown that mitochondria are transported along the cytoskeleton; they move, fuse, and separate while anchored to the cytoskeleton (Boldogh, 2001). Thus, the cytoskeleton plays an important role in the morphology and distribution of mitochondria throughout the cell cycle. Under normal conditions mitochondria appear as reticular tube-like structures located at the cortex of the cell. Under abnormal conditions, morphology takes on different forms, and mitochondria can begin to aggregate, or clump abnormally (McCoy, Johnson, Risan, 2003). These mutations are usually associated with some loss of function. The work we propose is based on previous research where proteins closely associated to the mitochondria were mutated (membrane associated proteins involved with fusion and fission of membranes) and morphological as well as distribution changes were observed (Brisch, 2001). However the changes were never associated with specific phases of the cell cycle. We plan to mutate three cell cycle genes, *cdc28*, *swe1*, and *bub1*. We will use a TS Degron/ PCR approach to generate temperature-sensitive cell cycle specific mutants. After successful transformation, we will examine mitochondrial morphology and distribution regarding our mutations via microscopy and fluorescent staining.

26

Title: Parent-Child Communication Program (PCCP) - Case Study #4

Presenter(s): Heidi Mork, Amanda Hoff

Department: Speech-Language Hearing Science (SLHS)

Advisor: Louis J. DeMaio, Ph.D.

Abstract: For our research project we are studying whether a mother's use of facilitative techniques increases after Parent-Child Communication Program (PCCP) training. Specifically, we are evaluating and comparing a mother's use of facilitative techniques in conversation with her preschool child before formal training with PCCP and after formal training with PCCP. Our ultimate goal is to determine if the mother's use of facilitative techniques has increased. Facilitative techniques include input, feedback, and revision components. These techniques improve a child's language when used by a mother during conversation. We hypothesize that the mother's use of facilitative techniques will increase after formal PCCP training.

27

Title: Ethics: An Imperative Part of Any Business

Presenter(s): Ryan Larson

Department: Accounting

Advisor: James Hansen

Abstract: We will look at how to be an ethical person. Also, we will explore why companies are getting in trouble. Why is this a problem now and what can our country do about it? Finally, we will analyze some of the steps and procedures that have already been taken in solving this ethical crisis in our country.

28

Title: Alike, but not the same: A lesson on human genetic variation.

Presenter(s): Nathan Huseby, Tom Larson

Department: Biology

Advisor: Alison Wallace

Abstract: A class wide inventory of human traits to compare and contrast the similarities and differences of these traits.

29

Title: A Lesson in Genetic Probability

Presenter(s): Kate Pfeifer, Tessa Jetvig

Department: Biology

Advisor: Alison Wallace

Abstract: Participants will explore the relationship of genotype and phenotype, and the role of probability in genetics through an activity.

30

Title: Commedia Dell'arte

Presenter(s): Greta Frank, Steven Fick, Nick Foss

Department: Communication Speech, Film, and Theatre Arts

Advisor: Theresa Carson

Abstract: A short presentation of the history of Commedia Dell'arte, and then an acting presentation of this style of Theatre.

31

Title: Greek Theatre

Presenter(s): Megan West, Ben Matteson

Department: Communication Speech, Film and Theatre Arts

Advisor: Megan West

Abstract: An introduction to Greek Theatre and a performance in the portrayal of this type of acting style.

32

Title: Comparison of teacher certification procedures in U.S.A. and Russia

Presenter(s): Irina Gubareva

Department: Education

Advisor: Dean Mollerud

Abstract: In my presentation I'm going to compare the procedures of teacher certification in Russia and the USA and point out the priorities in the area of teacher preparation in both countries.

33

Title: Aseptic Technique

Presenter(s):

Department: Nursing

Advisor: Donna Heald

Abstract: Poster presentation describing the history, importance, and examples of aseptic technique.

34

Title: Keith Haring: Success and Controversy in Mass Exposure

Presenter(s): Jessica Keisacker

Department: Art

Advisor: Anna Arnar

Abstract: Keith Haring is, arguably, one of the most widely-distributed artists in the contemporary Art world. He was able to connect people with his works and messages in all demographic sectors. His activist art not only informed but created interest among the masses about issues surrounding intolerance, drug-addiction and AIDS. Keith Haring's views on mass production/distribution were controversial and revolutionary in the 1980's. I plan to discuss the formal qualities of his art, how his technique created a universal race and message and how the Pop Shop and other distribution plans created part the Keith Haring's legacy and controversy in the High Art arena.

35

Title: Extensions of Synthetic Division

Presenter(s): Jessica Trautwein

Department: Mathematics

Advisor: Derald Rothmann

Abstract: Most students usually encounter the basic synthetic division techniques in beginning algebra classes. There they use it to divide a polynomial $P_n(x)$ by a factor of the form $x-a$, obtaining a quotient $Q_{n-1}(x)$, remainder r , and byproduct $P_n(a)$. In this presentation I will show how repeated synthetic division can be used to evaluate derivatives of $P_n(x)$ at $x=a$. Some possible applications of these extensions will also be discussed.

36

Title: Shakespeare's Tragedies and Histories

Presenter(s): Jessica Zillgitt, Inga Haugen, Eric Gomez

Department: English

Advisor: Sandy Pearce

Abstract: Shakespeare's Tragedies and Histories A brief sketch of the papers we will be presenting:(A History) A Tragedy of Errors: The Misconception of Richard the Second as a Tragic Hero The most humorous element about the King Richard the Second lies in the dichotomy of his mouth and brain. In most instances the organ of the brain and mechanics of the mouth work in conjunction and compliment the other. Yet, poor Richard surrounds himself with sycophants and toadies all the while spouting the most beautiful metered poetry. Stupidity does not equate to tragedy. Though The Necessary Shakespeare by David Bevington titles Shakespeare's play The Tragedy of Richard the Second, the character of Richard the Second clearly does not conform to the criterion of a tragic hero according to the Aristotelian model. Using four common criteria from Aristotle's Poetics, and evaluating Richard the Second's characteristics will show the error in this play's classification. (The Tragedy) The Cost of Linen in Othello Size really does matter. The smaller the piece, the more significant it is. In Othello, larger textiles, such as standards and sheets, are actually less important than a single handkerchief. The significance of textiles in the play occurs in an inverse proportion to their size and normal importance. A single handkerchief costs the lives of Cassio, Roderigo, Desdemona and Othello, whereas reputations buy wedding sheets and standards. This paper examines fabric references within Othello, specifically standards, sheets, and small pieces of apparel. (The other History) Shakespeare's Use of Traitors to Demonstrate Leadership of Kings in His Histories The kings in Shakespeare's second series of plays dedicated to the history of England present a large variety of personality traits and leadership methods. Evaluating the manner in which each king approaches subjects who conspire to disobey or destroy his reign reflects many of the differences in the leadership of the kings. These differences impact how audiences view each king's competence as a ruler. A comparison of the three kings' approaches to traitors illustrates the superiority of King Henry V's leadership qualities over those of King Henry IV and King Richard II.

37

Title: Mental Illness and Inmates

Presenter(s): Ashley Collins, Ashley Hartung

Department: Sociology

Advisor: Susan Humphers-Ginther

Abstract: People with mental illnesses are treated as maybe victims of a sickness in the mind. They are many times given as much help and love as others can provide. Although there are many inmates who are living with a mental illness. These people are treated as being the horrible criminals that prey on the victims. They are not treated as the victims as others with mental illnesses are. In many of these cases these inmates are affected by a mental illness that take over some of their criminal actions. Should these inmates be in prisons as criminals or psychiatric hospitals as victims?

38

Title: Commercial Banking: Nationally and Locally

Presenter(s): Darren Glur

Department: Economics (senior seminar, 498)

Advisor: Oscar Flores

Abstract: This presentation will focus on national and local banks. It will demonstrate certain strategies involved in order to maintain business and increase profits. The local market will also be compared to the national market to determine if the local Fargo-Moorhead banks are following the same trends that the national banking industry is following.

39

Title: Is Casino Gambling Profitable to the State?

Presenter(s): Dustin Jeske

Department: Economics

Advisor: Oscar Flores

Abstract: This presentation will attempt to explain if the state profits from the operation of Native American Casinos. (Using regression analysis)

40

Title: The Influence of Self-Generated Hand Gestures on Recall

Presenter(s): Sarah Grabowska

Department: Psychology

Advisor: Magdalene Chalikia

Abstract: The combination of hand gestures and speech is a possible means to facilitating communication and learning, which has been supported by research. Very few studies have measured the effects of self-generated hand gestures on cognitive functions. My research analyzes the influence of self-generated hand gestures on word recall.

41

Title: Small Group Decision Making

Presenter(s): Angela Baukol

Department: Speech Communication

Advisor: Tim Borchers

Abstract: I will be presenting a research paper discussing the problem solving and decision making processes within a small group. The presentation will discuss how effective these processes are when used by a small group in the workplace.

42

Title: Portfolio Assessment of Young Children

Presenter(s): Shelly Kubista, Courtney Gaa, Erin Muff, Melissa Hannig, Katie Quade

Department: Elementary and Early Childhood Education

Advisor: Karen Danbom

Abstract: Our session will look at the benefits of ongoing, observational assessments of young children. We have created portfolios using multiple methods of assessment. We observed a Hispanic, bilingual child and a child with Down syndrome. Early childhood characteristics provide evidence that this method is more reliable than standardized testing of young children. Portfolio assessments initiate excellent conversations with parents, as opposed to reading scores from standardized testing results.

43

Title: The Parent-Child Communication Program: Case Study #5

Presenter(s): Sarah Jacobs, Jen Mau

Department: SLHS

Advisor: Louis DeMaio

Abstract: The study we conducted was one of twelve that analyzed the effect of the Parent-Child Communication Program on a mother with a child that has delayed language. Dr. Louis De Maio developed the Parent-Child Communication Program (PCCP) in 1998 to teach parents a method that will promote their child's communication and language. This study compared the mother's use of questions before and after the training program.

44

Title: Chemical Characterization of Ostariophysan Alarm Substance

Presenter(s): Bethany Ehlers

Department: Biology

Advisor: Brian Wisenden

Abstract: The Ostariophysi is a group of freshwater fishes that include the minnows, tetras, catfishes and suckers. Collectively, they comprise about 64% of all freshwater fish species in the world. One feature that all of these fish have in common is the presence of specialized cells in their skin that contain an alarm substance. When the fish is attacked by a predator, these cells are ruptured and the substance is released. Nearby fishes smell the chemical and adopt antipredator behaviors that reduce their probability of being captured by the predator. The chemical nature of alarm substance is not well understood. Some evidence points toward a small molecule, other evidence suggests that it is a large molecule such as a protein. In this study, we used dialysis tubing to separate skin extract of zebra danios into large and small molecules and tested if each fraction retained the ability to invoke a fright behavior in zebra danios. Understanding the chemical nature of this signaling system will contribute to greater understanding of the ecology of this dominant group of fishes.

45

Title: Children's Literature - A cooperative study

Presenter(s): John Myers

Department: Elementary and Early Childhood Education

Advisor: Barb Worman

Abstract: The presentation will discuss a project I was involved in concerning children's literature. Literature has a drastic effect on children's lives and it is something that is a necessity in order to grow and mature. Cooperative learning involves both give and take in children's lives.

46

Title: Investigation of a Novel Method to Purify Plasmid DNA

Presenter(s): Amanda Anania

Department: Biology

Advisor: Dr. Mark Wallert & Dr. Joseph J. Provost

Abstract: Plasmid DNA is a small DNA containing self-reproducing element that exists outside the chromosome, such as in particular types of bacteria. They have the potential to alter a hereditary characteristic when introduced into another bacterium. Plasmid DNA is used in many biotechnology applications. Thus, there is a high demand for pure and inexpensive DNA that is easy to produce. The current state of purification of plasmid DNA takes around 8 hours to complete and is expensive because most commercially available kits are not reusable. We are working with a new material that can decrease the time involved with plasmid purification, cut the costs, and is reusable. Endotoxin is a bacterial protein that commonly co-purifies with DNA and is a potential problem for using the DNA with mammalian cells and for gene therapy. This new kit will decrease the amount of endotoxin without using detergents or other potentially dangerous compounds used in many kits. By using this new material, we hope to achieve comparable yields and purity obtained by the popular conventional methods/kits. Ultimately, the process can be beneficial in the aid of production of such important substances such as insulin or other biotechnology produced proteins.

47

Title: The Influence of Prayer and Religious Beliefs on Measures of Life Satisfaction

Presenter(s): Lindsay Ranstrom

Department: Sociology

Advisor: Sue Humphers-Ginther

Abstract: Although the topic seems to be a bit taboo in our present society, there seems to be a documented relationship between religious practices, membership in a church family, and a personally fulfilling religious experience with life satisfaction and health of people even today. Moreover, prayer as a part of this experience serves an important function in the lives of many. In particular, it influences satisfaction and health of these individuals in many different and personal ways. As Ted Mitchell (2000) asserts, research has pointed out that when individuals are recovering from surgery or other health related problems, those who did not draw comfort and strength from religious practices (perhaps prayer and interactions with other believers) were seven times more likely to die within six months of the surgery. It is by these types of empirical findings that suggest that faith and religion play a larger part in human life than is often thought. In my examination of these relationships, I plan to use the GSS (General Social Survey) as my source of data collection. My research will focus on the correlation between prayer and life satisfaction, as this may have implications into bettering the lives of many people around the world. I will incorporate the findings of the survey with present research in this field to make up the base of my examination and following paper and poster presentation. After analyzing and interpreting the data found here and the literature, I hope to be able to understand the relationship and influence prayer has on the greater forces of well being in our society and also why some people are dedicated to these practices while others refuse to engage themselves or simply remain indifferent to the topic and its' potential influence on their life.

48

Title: The Parent-Child Communication Program, Case Study #8

Presenter(s): Geniece Kizima, Sarah Palmer

Department: Speech/Language/Hearing Sciences

Advisor: Louis De Maio

Abstract: The purpose of the study was to evaluate the effectiveness of the Parent-Child Communication Program (PCCP) in training parents as language facilitators. The program was developed by Dr. Louis J. De Maio in 1998 and is currently used at Minnesota State University Moorhead's Speech, Language and Hearing Clinic. The study evaluated the effectiveness of the therapy in reducing the frequency of questions asked by the parent during interaction with their child. Results show the program helped the parent reduce the number of questions asked during communication with the child, resulting in the parent being a responder rather than conversation initiator - thus promoting language development in the child.

49

Title: The Changing Face of St. Francis de Sales

Presenter(s): Megan Wittmier

Department: American Studies

Advisor: Helen Sheumaker

Abstract: We will be presenting the history of the many changes that have occurred over many years in the Catholic church of St. Francis de Sales

50

Title: Phospholipase D Regulates Stress Fiber Formation By Phenylephrine Stimulation in CCL39 cells

Presenter(s): Kit Mitchell, Jessica Johnson, Rachel Sang

Department: Biology

Advisor: Joseph Provost/Mark Wallert

Abstract: Stress fiber formation is an important event in regulating the cell growth and migration of cells. G protein-coupled receptors induce stress fiber formation through a variety of mechanisms. Several studies implicate Gq in the activation of stress fibers however the mechanism is unknown. In endothelial cells, migration requires both ERK and phospholipase D (PLD) activity. We report here that the addition of the specific $\alpha 1$ -adrenergic agonist, phenylephrine (PE) to CCL39 fibroblasts induced stress fiber formation similar to that found with cells treated with lysophosphatidic acid (LPA). PE induced stress fibers were significantly inhibited in cells treated with the MEK inhibitor PD98059, or primary alcohols. To investigate the signaling pathway mediating the adrenergic receptor, we examined the ability of PE to activate a number of potential signaling intermediates. Addition of PE induced a three-fold increase in PLD activity and a large increase in ERK phosphorylation. Moreover, PE activation of ERK was blocked by the addition of 1-butanol but not 2-butanol. Finally, activation of ERK by PE was attenuated when cells expressed a dominant negative RhoA. These data suggest that PE-stimulated stress fiber formation is mediated by ERK activation and that this pathway is likely activated by action of PLD. Additional evidence for the role of $\alpha 1$ -adrenergic receptors in regulating cell growth is shown by assaying wound healing rates in the presence or absence of 1- and 2- butanol. Specifically, evidence has shown that PE stimulation affects the rates of wound healing in scratch assays. Taken together, these results indicate a novel role for PLD in activation of the ERK growth pathway to stimulate early cellular events induced by PE. This work was supported by a MSU Moorhead Faculty Grant, NSF - DUE 0088654 and MRI - DBI 0110537

51

Title: How Do First-Syllable Characteristics Affect Visual Word Recognition of Long Words?

Presenter(s): Emily Hugh

Department: Psychology

Advisor: Christine Malone

Abstract: This study was conducted to see if neighborhood size affected the reaction time of word recognition. Neighborhood similarity is defined as the number of other words that have all but one letter in common with the original word. We hypothesize that larger neighborhoods will facilitate faster word recognition. Words will be presented on a computer screen. Participants will have to identify the word as quickly as possible. Reaction time and accuracy will be analyzed.

52

Title: Phospholipase D Regulates Stress Fiber Formations By Phenylephrine Stimulation in CCL39 cells

Presenter(s): Jessica Johnson, Rachel Sang

Department: Biology

Advisor: Mark Wallert/Joseph Provost

Abstract: Stress fiber formation is an important event in regulating the cell growth and migration of cells. G protein-coupled receptors induce stress fiber formation through a variety of mechanisms. Several studies implicate Gq in the activation of stress fibers however the mechanism is unknown. In endothelial cells, migration requires both ERK and phospholipase D (PLD) activity. We report here that the addition of the specific $\alpha 1$ -adrenergic agonist, phenylephrine (PE) to CCL39 fibroblasts induced stress fiber formation similar to that found with cells treated with lysophosphatidic acid (LPA). PE induced stress fibers were significantly inhibited in cells treated with the MEK inhibitor PD98059, or primary alcohols. To investigate the signaling pathway mediating the adrenergic receptor, we examined the ability of PE to activate a number of potential signaling intermediates. Addition of PE induced a three-fold increase in PLD activity and a large increase in ERK phosphorylation. Moreover, PE activation of ERK was blocked by the addition of 1-butanol but not 2-butanol. Finally, activation of ERK by PE was attenuated when cells expressed a dominant negative RhoA. These data suggest that PE-stimulated stress fiber formation is mediated by ERK activation and that this pathway is likely activated by action of PLD. Additional evidence for the role of $\alpha 1$ -adrenergic receptors in regulating cell growth is shown by assaying wound healing rates in the presence or absence of 1- and 2- butanol. Specifically, evidence has shown that PE stimulation affects the rates of wound healing in scratch assays. Taken together, these results indicate a novel role for PLD in activation of the ERK growth pathway to stimulate early cellular events induced by PE. This work was supported by a MSU Moorhead Faculty Grant, NSF - DUE 0088654 and MRI - DBI 0110537

53

Title: Breathing, How it Works!

Presenter(s): Candace Lembke

Department: Biology

Advisor: Alison Wallace

Abstract: Differences between negative pressure and positive pressure breathing. Mechanisms of getting oxygen into the lungs and than into the blood system.

54

Title: Is Mitochondrial Inheritance Tissue Specific? A New Look at the mtDNA Dogma from a Cell Biology Perspective.

Presenter(s): Streitz Lisa

Department: Biology

Advisor: Ellen Brisch

Abstract: Mitochondria play critical roles in the generation of metabolic energy (ATP) in eukaryotic cells. ATP is essential in driving many of the reactions that take place in the body. The role of a mitochondrion is to maximize and control the production of ATP. Furthermore, these cytoplasmic organelles make their own circular DNA, which is referred to as mitochondrial DNA (mtDNA). It is important to note that there is a distinction between nuclear DNA and mtDNA. While nuclear DNA encodes most of the proteins that drive mitochondrial processes, some critical ATP-producing enzymes are encoded in the mitochondrial genome. Mitochondria are extremely important to study because almost any mutation in mtDNA leaves an organism somewhat debilitated, by causing mitochondrial myopathy. Mitochondria have been thought to be maternally inherited for over twenty years. Results from previous experiments show that a child's mtDNA will be identical to that of the mother. Does this mean that there is no paternally inherited DNA? Perhaps not, however researchers have mainly focused on testing mtDNA in blood samples. To examine if inheritance patterns differ between tissues, Heidi Jo Johnson, Austin McCoy and Jen Risan began planning an experimental approach and protocol development to test our hypothesis. Our hypothesis is that blood and muscle tissue will inherit mitochondria from different parents. The approach I am using to test my hypothesis is to sequence the mtDNA taken from two different strains of mice. Next, I plan to cross the parent mice and sequence the mtDNA of their offspring. I will be sequencing mtDNA from the blood as well as from the muscle tissue to see if mtDNA inheritance is, indeed, tissue-specific. Currently, I have completed mitochondrial isolation from different tissues and mtDNA extraction. Verifying the specificity of mitochondria is an important step for figuring out what cellular mechanisms are required to direct the mitochondria into different tissues. This may open a whole new way of looking at mitochondrial inheritance and ultimately show us how this system is regulated.

55

Title: A Glimpse Into the World of a Systems Analyst

Presenter(s): William Gabel, Jr., Alycia Plattner

Department: CSIS

Advisor: Daniel Brekke

Abstract: This presentation will demonstrate the skills that we learned in the Systems Analysis and Database Design courses that are offered in the Computer Science and Information Systems Department. Our focus will be on the data modeling aspect of the System Development Life Cycle.

56

Title: An Initial Biochemical Analysis of Autism

Presenter(s): Jill Skolte, Moses Wananu

Department: Biology

Advisor: Joseph Provost

Abstract: Autism is a pervasive developmental disorder with a collection of behavioral symptoms including dysfunction in social interaction and communication in affected children. Autism is associated with sensory disturbances, obsessive-compulsive-like behavior, lack of bonding to caregivers and motor disturbances. We have obtained lymphocyte cells from children with and without autism and are going to test them for several proteins which may be altered in children with autism. While there is little understanding of the biochemical basis for the cause of autism, one phenomenon of this disorder is the formation and development of neural synapses. A significant percentage of people with autism display chromosomal alterations in chromosomes 9 or 15. The genes associated with these abnormalities code for two proteins called hamartin and tubarin. These proteins are very closely related and when functioning normally, regulate the small G-protein RhoA. RhoA is an important signaling molecule which regulates cytoskeletal structure, important for cell growth and development. RhoA also activates the sodium-hydrogen exchanger (NHE), and NHE may act as an anchor for cytoskeletal proteins. Thus alteration in either RhoA or NHE would significantly impact the development of neural cells as they mature. We intend to test for RhoA activation levels in our cells and for NHE activity. With this research we hope to gain an understanding of one potential cause of autism.

57

Title: The Correlation of the Proportion of Errors between Staggered Spondaic Word and SCAN-C tests

Presenter(s): Marin Almer, Rose Cotton

Department: SLHS

Advisor: Louis De Maio

Abstract: This presentation studies the relationship between two auditory processing disorder tests. A random assessment of twelve children from the Minnesota State University Moorhead-Auditory Processing Disorders clinic was done in which we compared the results of the SSW and SCAN tests to see if they could be used interchangeably in screening and diagnosing Auditory Processing Disorder.

58

Title: Effect of Environmental Stresses on Corn Root Respiration

Presenter(s): Julie Knutson, Jodi Hendrickson, Carrie Leopold

Department: Biology

Advisor: Dr. Chris Chastain

Abstract: Plant roots are subject to a wide array of environmental stresses such as drought, salinity, flooding, and extremes of temperature. In this study, we sought to determine which of the above environmental stresses are the most acute and which are the most benign. We selected root tissue respiration rate as a comparative measure of how stress can effect the health and function of the root as a whole, since respiration is a processes directly tied to the central process of energy (ATP) production in the corn root cells. Presented will be comparative measurements of root respiration rates on root tissue obtained from 3 day old corn root seedlings that have been subjected to simulated drought, salinity, flooding, and high/low temperature stress.

59

Title: Can corn root respiration be stimulated by pre-treating corn roots in iron fertilizer?

Presenter(s): Tom Larson, Rich Teske

Department: Biology

Advisor: Chris Chastain

Abstract: Respiration in corn roots is due to the uptake of O₂ by cellular mitochondria. This in turn leads to synthesis of ATP by the mitochondria that is required for the physiological functions of the root. This study was conducted to see if supplementing corn roots with large doses of iron fertilizer can stimulate the rate of respiration via increasing the iron containing enzymes of the mitochondria. Respiration measurements will be performed on root tissue obtained from 3-day old germinated corn seedlings using an oxygen electrode. Data from these measurements, along with other indirect biochemical measurements of root mitochondrial function, will be presented.

60

Title: Do Elevated Levels of Potassium Ion in the External Medium of Corn Roots Stimulate Respiration and Therefore ATP Synthesis?

Presenter(s): Justin Noehre, Michael Fohl, Jesse Cox

Department: Biology

Advisor: Chris Chastain

Abstract: Potassium (K⁺) is a major plant mineral nutrient that plants extract from the soil using an ATP-dependent cell membrane-mediated process. We sought to test the concept that as roots are exposed to higher amounts of K⁺ in the soil, they also should need to produce increased amounts of ATP. This in turn should necessitate a higher respiration activity in order for the mitochondria to meet the demand for more ATP synthesis. In order to investigate this proposed link between high K⁺ and respiration, we utilized root tissue from three day old corn seedlings germinated and grown in the presence of high or low amounts of KCl. Respiration rates were measured using an O₂ electrode. Other assessments of the putative effects of high levels of K⁺ on corn root respiration will include the use of respiratory inhibitors and enzyme analysis.

61

Title: Short-Term Effects of Removing Energy (sucrose) Supply to Growing Corn Roots.

Presenter(s): Tessa Jetvig, Kate Pfeifer

Department: Biology

Advisor: Chris Chastain

Abstract: Roots must obtain their food (sucrose) from the photosynthetic portions of the plant leaves via the phloem. In certain cases, such as short term water stress or phloem disease, roots can be cut off from this energy source and essentially have to scale back on energy requiring physiological functions such as extraction of mineral nutrients from the soil. In order to investigate the rapidity on how terminating energy (sucrose) supply to growing root can effect production of cellular energy in the root, we measured respiration rates in 3 day old corn seedling roots that had been excised from the kernel they grow from and receive sucrose from until the leaf emerges. The data gained from this study will be used to predict the interdependence of sucrose supply to the root and the ability of the root to produce its own cellular energy (ATP) for fueling energetic physiological processes such as extraction of minerals from the soil.

62

Title: Effect of Aluminum Ion on Corn Root Respiration

Presenter(s): Jon Frykman, Amanda Hanson

Department: Biology

Advisor: Chris Chastain

Abstract: Various metal ions found in soils are actually toxic to plant growth. One such metal ion is aluminum, which has a striking inhibitory effect on growth of roots. In this study, we examined the relationship between root cell respiration and aluminum toxicity in corn roots. As the central energy producing process in the cell, we expect (mitochondrial) respiration to be a site of aluminum poisoning that may explain inhibition of root growth. Data will be presented showing respiration rates of growing corn roots treated with aluminum ions (Al³⁺) compared to untreated controls.

63

Title: Survey of Wild Turkey (*Meleagris gallopavo*) Distribution in Cass and Clay Counties

Presenter(s): Natasha Gruber, Katie Geray, Tracy Mastel

Department: Biology

Advisor: Dr. Donna Bruns-Stockrahm

Abstract: The Minnesota Department of Natural Resources (DNR) is currently working on a wild turkey (*Meleagris gallopavo*) reintroduction program in northwestern Minnesota. To determine the current populations of wild turkeys in Cass County, North Dakota, and Clay County, Minnesota, we distributed surveys along the Red River in the Georgetown, Kragnes, Oakport, Kurtz, and Holy Cross Townships of Clay County, and along the Sheyenne River in the Harwood and Reed Townships of Cass County. Information about the survey was also placed in the Barnesville Recorder and in The Fargo Forum, and those interested contacted us. Surveys were also filled out at the annual meeting of the local chapter of the National Wild Turkey Federation. We received a total of 64 usable surveys and 11 usable emails. A total of 537 birds were reported sighted, with 59 identified as toms (male) and 94 identified as hens (female). However, because we have no way of knowing if some of the turkeys were sighted more than once, the actual number reported is probably inflated. Through this survey, we have discovered a thriving population of wild turkeys in Cass and Clay Counties, and a hunting season may be opened in the area. In the future, we plan to continue surveying residents as well as using GIS techniques to predict if human interactions with wild turkeys are increasing.

64

Title: The Relationship of Root Cell Membranes "Leakiness" on Root Tissue Respiration Rate

Presenter(s): Thomas Colquhoun

Department: Biology

Advisor: Chris Chastain

Abstract: The relationship of root cell membranes "leakiness" on root tissue respiration rate Plant roots are subject to many agents in the soil that can cause transient holes or leaks in the outer cell membranes. Such agents include pathogenic fungi and extremes of cold and heat. In response, the plant must respond by repairing damaged membranes. We propose this repair response must be accompanied by an increase in energy (ATP) production by the root cell mitochondria. To test this hypothesis, we examined how respiration rate in corn roots responded to certain detergents that effectively "punch holes" in the membrane. These results will be displayed along with other enzyme based data that will illustrate how the central cell process of respiration is involved in maintaining cell membrane integrity.

65

Title: A Look at the Changing Music Industry from an Economic Perspective

Presenter(s): Chris Liberda

Department: Economics

Advisor: Oscar Flores

Abstract: The introduction of digital music and peer-to-peer file sharing has had an enormous impact on the music industry. In this presentation I will look at how changes in technology have changed the form of good that music has taken. I will incorporate economic tools and analysis to quantify the effects that certain technological changes have had on music and the implications that arise.

66

Title: Cohabitation and Divorce

Presenter(s): Jessica Roshau

Department: Sociology

Advisor: Dr. Sue Humphers-Ginther

Abstract: To examine the relationship between cohabitation and divorce. Focusing on various living arrangements and how they effect relationships later in life. While looking at the current divorce rate in relation to the struggles of today's family.

67

Title: The Role of PKC in RhoA Activation and Stress Fiber Formation

Presenter(s): Alison Metcalf, Tabitha Burnside, Matthew Duval

Department: Biology

Advisor: Joseph Provost

Abstract: Stress fiber formation in Chinese hamster lung fibroblasts (CCL39) requires activation of both RhoA and the sodium-hydrogen exchanger (NHE). We have recently demonstrated that Extracellular-Signal Regulated Kinase (ERK) and NHE are activated in response to the $\alpha 1$ -adrenergic agonist phenylephrine (PE). Our initial data also indicates that PE stimulates the translocation of RhoA to the plasma membrane, while traditional $\alpha 1$ -adrenergic stimulation acts through Protein Kinase C (PKC). In this study we plan to investigate the role of PKC in RhoA and stress fiber activation. We will test the effects of three PKC inhibitors: bisindolylmaleimide I (BIM), Go6976, and Ro-31-8220. BIM is a derivative of the general PKC inhibitor staurosporine that acts as a competitive inhibitor for the ATP-binding site of PKC. It is highly specific for PKCa, bl, bli, g, d, and e isozymes. Go6976 is an indolocarbazole that specifically inhibits PKCa by blocking Ca^{2+} binding. Finally, Ro-31-8220 is a staurosporine analogue that inhibits active membrane-bound PKC 12.5 times better than cytosolic PKC. In all of our experiments, Phorbol-12-myristate-13-acetate (PMA) is our positive control. PMA directly activates PKC by mimicking diacylglycerol thereby bypassing a PE requirement. To measure the ability of PE to activate RhoA, EGFP-tagged RhoA is used to observe translocation. Unstimulated control cells display RhoA dispersed throughout the cytoplasm, while PMA stimulated cells show RhoA predominantly associated with the plasma membrane. To measure the role of PKC in RhoA stimulation, PE treatment will be done in the presence and the absence of PKC inhibitors. Once RhoA translocation is characterized, we will then investigate the role of PKC in stress fiber formation. We propose that PKC is required for the activation of RhoA and ultimately the formation of stress fibers.

68

Title: The Malady of Fibromyalgia

Presenter(s): Tanya Knudson

Department: Physical Education-Athletic Training

Advisor: Dawn Hammerschmidt

Abstract: An introduction to the facts on fibromyalgia, and discussion on the controversies of the disease.

69

Title: Genetic Diversity Influencing Survival Among Declining Populations of Black-tailed Prairie Dogs.

Presenter(s): Tracy Mastel, Alisha Pagel, Lee Gertsen

Department: Biology

Advisor: Michelle Malott

Abstract: The populations of black-tailed prairie dogs are steadily declining due to a variety of human-impact factors such as habitat alteration, recreational shooting, and agricultural control. A study on genetic diversity could provide valuable insight on survival of black-tailed prairie dogs in future generations. We are using PCR to examine micro-satellites in order to compare the DNA of black-tailed prairie dogs between and among prairie dog towns from Theodore Roosevelt National Park. Micro-satellites are areas of the genome that are highly variable between individuals and can be used as markers of genetic variability in populations. We are presenting our results and conclusions thus far on this topic. In our continuation of research with black-tailed prairie dog DNA we hope to determine whether or not genetic invariability could potentially cause a population decline to the point of extinction.

70

Title: Effects of Oxidative Stress on *Saccharomyces cerevisiae* FKH1 Transcription Factor Knockout

Presenter(s): Heidi Johnson, Faith Dahl, Dan Feir

Department: Biology

Advisor: Michelle Malott

Abstract: Forkhead proteins are known to play a role in regulating early development, cell differentiation, and cell cycle progression in many different eukaryotic cells. FOXO3a is a protein from the forkhead FOXO family of human transcription factors. Transcription factors play an important role in regulating cell cycle, cell death, and oxidative stress. They bind DNA through a winged-helix structure. Once translocated into the nucleus, they are able to induce the transcription of genes necessary for these specific functions in the cell. *Saccharomyces cerevisiae* is a model organism commonly used to study many of these fundamental processes. FKH1 and FKH2 are yeast forkhead transcription factor proteins in *S. cerevisiae* yeast cells. Although there have been limited studies on FKH1 and FKH2, the conserved DNA binding domain among transcription factors suggests that the yeast transcription factors will behave in a similar fashion to that of FOXO3a. Therefore, FKH1 and FKH2 could be used as a means to study the role of forkhead transcription factors in cellular response to oxidative stress. Bioinformatic analysis will be performed to obtain the conservation between these three forkhead proteins. Preliminary data has suggested that oxidative stressors, such as hydrogen peroxide, cause DNA damage to cells. When the cell is exposed to hydrogen peroxide, FOXO3a initially inhibits the process of apoptosis, possibly allowing the cell to repair its damaged DNA. We hypothesize that FKH1 and FKH2 will behave in a similar manner. We will focus on the FKH1 protein while performing experiments with wild type strains along with mutated strains lacking the FKH1 gene.

71

Title: Deadly Diseases Among Us

Presenter(s): Adriane Cooper, Mariya Rzaszutak, Virginia McCamant

Department: Biology

Advisor: Alison Wallace

Abstract: Infectious diseases continue to be a major cause of human suffering and death. This event is a high school level group activity which will allow students to compare and contrast emerging and re-emerging infectious diseases, how they are transmitted, and other common characteristics of each disease.

72

Title: Relating the Biological, Ecological and Societal Values in Order to Bring Attention to the Overall Importance of Virgin Prairie Land to Our Region and Nation as a Whole.

Presenter(s): Holly Kleffer

Department: Biology

Advisor: Chris Chastain

Abstract: My goal is to illustrate to a general audience the importance of our lands heritage, Virgin Prairie Land. I plan to do so by stating the interrelationships between the biological ecological and societal viewpoints. Together these three topics come together to further prove that this rare and beautiful resource should be preserved and protected by both the law and the general public. With the knowledge of such importance of this vast resource I hope to instill both hope and action. We can overcome the blatant disregard for this precious gem and begin to appreciate our regions gift, Virgin Prairie Land.

73

Title: Green Fluorescent Protein Purification and Polyclonal Antibody Production in Rabbits

Presenter(s): Derick Burgad, Alicia Levorsen, Amanda Lipp

Department: Biology/Chemistry

Advisor: Dr. Joseph Provost

Abstract: The gene that encodes the green fluorescent protein (GFP) comes from *Aequorea victoria*. This gene was transformed and expressed in *Escherichia coli*. A lysate solution of the GFP expressing *E. coli* was then prepared for purification and injected subcutaneously into rabbits for polyclonal antibody production. The purpose of this experiment was to produce rabbit specific polyclonal antibodies toward a highly purified preparation of the antigen GFP. The purification process involved dialysis to reduce the salt concentration and the use of two different chromatography columns. The first an IEC column containing DEAE Sephacel, to fractionate the sample based on charge and the second step was a SEC column using Sephadex S-100 beads to fractionate the proteins by size. Following the purification through each column, the fractions were collected and analyzed by the Bradford method to determine protein concentration. The final protein sample was then concentrated using a Centriprep YM-10 centrifugal filter unit. Analysis was performed on the final sample to determine purity by an SDS-PAGE gel. The final sample was then emulsified using complete freunds adjuvant and a boost with incomplete freunds adjuvant. Four weeks post injection sera was isolated. The titer of the sera was tested by both Western blot and an ELISA.

74

Title: The Rise of Korean Nationalism Leading Up to the Samil

Presenter(s): Rebecca Vave

Department: History

Advisor: Henry Chan

Abstract: On March 1, 1919 the people of Korea gathered in Pagoda Park in Seoul, as well as in various other places across Korea, in a moving demonstration of their longing for independence. It has been said that Korean nationalism was born in that movement, now called the Samil. In this paper, I trace the rise of Korean nationalism leading up to the Samil. I contend that the nationalistic fervor of the Samil Movement was not born in a day. It was painfully grown from the seeds of the legacies of the past, the disparaging Yi Dynasty, and foreigner encounters, particularly the oppressive Japanese colonization.

75

Title: Anti-Germanism in Clay County

Presenter(s): Amber Boyd, Rachel Andersen

Department: American Studies

Advisor: Helen Sheumaker

Abstract: Germans are and have been one of the largest ethnic groups in Clay County. However, the German culture, people, and language have not always been accepted and desired additions to the community. World War I created an anti-German movement that spread across the nation and this area of the country was no exception. This is a research project for the American Studies Senior Seminar (AMST419) and focuses on the local attitude changes towards German people and things during the WWI era.

76

Title: The Determinants of Homeownership in the United States of America

Presenter(s): Heidi Petersen

Department: Economics

Advisor: Dr. Oscar Flores-Ibarra

Abstract: This presentation uses regression analysis to determine the different factors that affect the percentage of citizens who become homeowners in the United States of America. It is a time series analysis with data from 1971 to 2001.

77

Title: Designing Physical Anthropology Labs: An Exercise in Active Learning

Presenter(s): Jennifer Bengtson

Department: Anthropology and Earth Science

Advisor: Rinita Dalan

Abstract: The Department of Anthropology and Earth Science has recently restructured its introductory physical anthropology course in order to provide a more effective learning environment for students. This has been accomplished through the use of several small interactive lab sessions, complemented by an expanded and improved collection of primate and hominid fossil casts purchased through a grant from the Center for Teaching and Learning. These activities have improved learning in subjects like primate taxonomy and early hominid evolution and have provided an opportunity for students to work more closely with their instructor and classmates. As a lab assistant, I have been active in designing the labs and working with students during the sessions. The experience has expanded my knowledge of the subject, improved my ability to work with students, and reinforced my desire to continue my education in this field. I look forward to conducting research as well as working in an academic setting in the future, and I believe this experience will prove invaluable to my accomplishment of those goals.

78

Title: Language Disorders: The Elements and Instituting a Classroom Model.

Presenter(s): Lindsay Gilleshammer, Angie Villarreal

Department: Speech/Language/Hearing Sciences

Advisor: Louis De Maio

Abstract: This presentation will focus on identification (assessment), intervention, and facilitation of classroom models. We will present how the speech language pathologist along with the teacher come up with individual input that essentially affects the delivery of quality services for a child. We will also focus on instituting a classroom model.

79

Title: Racism and MSUM

Presenter(s): Pablo Guajardo

Department: American Multicultural Studies and the Humanities

Advisor: Phyllis Phyllis May-Machunda

Abstract: For any institution there is an inherent resistance to change. I will demonstrate what I learned about the effect racism has had on the student body, the nature of the University and efforts made to change that nature over the course of several decades. This will involve interviews with students and faculty past and present, surveys of the student body and several of the documents dealing with this issue back.

80

Title: Comparison of Growth Rates and Survival of Painted Turtles (*Chrysemys picta*) in Clay County, Minnesota

Presenter(s): Joanna M. Schmit, Natasha W. Gruber

Department: Biology

Advisor: Donna M. Bruns and Jerome Stockrahm

Abstract: Painted turtles (*Chrysemys picta*) were live-trapped during the summer and early fall of 2001, 2002, and 2003 in Clay County, Minnesota, to study growth rates, recapture rates between years, population characteristics, and movements. In 2001, 2 sloughs (< 2 km apart) were trapped, 2.7 ha and 6.2 ha, respectively. For 2002 only, a third slough (<1 ha) that was positioned between the first 2 sloughs was added to the study. For each captured turtle, outer scutes were notched for individual identification. Turtles were weighed, sexed and measured for length and width of carapace, then released. For 2001, data for 250 turtles were analyzed. In 2002, a total of 118 turtles were trapped where 75 were new animals (37 males, 30 females, 8 juveniles) and 43 (34 males, 9 females) were recaptured turtles from 2001. In 2003, a total of 190 turtles were trapped where 42 were new animals (20 males, 18 females, 4 juveniles) and 147 (107 males, 35 females, 1 juvenile, plus 4 females observed away from the sloughs) were recaptured turtles. In spite of intense trapping effort, trapping success between 2001, 2002, and 2003 varied greatly. Possible reasons for these differences, including mortality factors will be investigated. Growth rates and survival rates will be discussed.

81

Title: Nocturnal Behavioral Response to Chemical Alarm Cues by Tetra Fish

Presenter(s): Shantell Drew

Department: Biology

Advisor: Brian Wisenden

Abstract: Fish detect the presence of an active predator by chemical cues that are released when a predator attacks and injures its prey. Prey species can also use these alarm cues to associate the smell of the predator with danger, and later recognize the predator's presence by its smell even before it attacks. Both the response to chemical alarm cues, and learned recognition of predator odor have obvious survival benefits. Study of alarm responses to alarm cues have been conducted exclusively during daylight hours. Many predators are nocturnal and feed at night. In this study, we tested if tetra fish (*Pristella*) show a behavioral response to chemical alarm cues at night. Using room light timers, we shifted the day/night cycle of tetras so that we could study nocturnal behavior during the day. We gave the fish the odor of a another fish species, a cichlid, and either water or tetra alarm cues. We recorded activity and vertical distribution - two measures of antipredator behavior. This tested if tetras give an overt behavioral response to alarm cues at night, and if they already recognize cichlid odor as an indicator of danger. We changed the water and retested the same fish several days later, this time with only cichlid cues. This tested for learned recognition of cichlid odor as dangerous. We found no evidence of an overt behavioral response to alarm cues at night, nor any evidence of recognition learning during daylight conditions. This result suggests that the alarm reaction and recognition learning may be conditional upon the presence of light. Attentiveness to chemosensory indicators of predation risk may occur only when awake.

82

Title: Parent-Child-Communication-Program Case Study #10

Presenter(s): Ludmi Jinadasa, Roshani Goonewardena

Department: Speech-Language-Hearing Science Department

Advisor: Dr. Louis De Maio

Abstract: The study we conducted was one of twelve studies that analyzed the effects of the Parent-Child Communication Program on a mother with a child who has language delay. Dr. Louis De Maio developed the Parent-Child Communication Program (PCCP) in 1998 to teach parents a method that will promote their child's communication and language development. In this study we analyzed the mother's use of Initiations, Responses and questions before and after PCCP training.

83

Title: Seeing the Unseen with Geophysical Methods

Presenter(s): Amanda McCracken, Melissa Beer

Department: Anthropology/Earth Science

Advisor: Rinita Dalan

Abstract: Ongoing research has been directed toward uncovering secrets that the Hopewell Culture (200 BC-AD 500) of the Midwest have left behind. The Hopewell Culture created hundreds of mounds and earthworks throughout the Mississippi River valley, but our area of interest is the earthworks located in Ross County Ohio at the Hopeton archaeological site. Due to site degradation, traditional archaeological methods are not sufficient to answer questions about where an earthwork was and how it was built. By means of geophysical methods, we are able to "see" what cannot be seen with the naked eye on the surface or in archaeological excavations. This presentation will focus on the geophysical methods used as well as the answers that have been produced from our research.

84

Title: Sri Lanka: Facts about the Culture, Life style, Education, Civil War and Terrorism

Presenter(s): Ludmi Jinadasa, Roshani Goonawardena, Shanaka Herath, Pushpakantha Rajapakse, Amal Alles, Pat Jinadasa, Samadhi Wijesighe

Department: Office of International Programs

Advisor: Kim Gillette

Abstract: Sri Lanka is a country in Southern Asia. It is an Island in the Indian Ocean, South of India. Sri Lanka is a county slightly larger than West Virginia but the population exceeds 19 Million. We have 17 Sri Lankan students as well as 3 Faculty members currently at MSUM. This will be a great experience to know about SRI LANKA.

85

Title: Parent-Child Communication Program: Case Study #1

Presenter(s): Angela Haynes, Amy Ruzicka

Department: Speech Language Hearing Sciences

Advisor: Louis De Maio

Abstract: This presentation is on a case study on the Parent-Child Communication Program, developed by Dr. Louis De Maio. The program teaches parents how to talk with their children to facilitate their children's communication. We measured the number of questions the mother asked her child before training and the number she asked after training and compared the two amounts to see if she decreased her amount of questions asked. The results show that she significantly decreased the amount of questions asked to her child.

86

Title: Modeling of Upper-Level Degrees Earned Among Different Races

Presenter(s): Ann Johnson, Erin Richgels, Shamus Funk

Department: Mathematics

Advisor: Ellen Hill

Abstract: A comparison of the number of upper-level degrees earned per year among different races. Analysis of different degrees earned will be made regarding to degrees vs. time, and the number of degrees earned by different races will be compared against each other. Statistical analysis may be provided as well.

87

Title: Clay County Italian Immigration: Italian Influence on Local Beauty Industry

Presenter(s): Beth Splonskowski, Kristi Hilton

Department: American Studies

Advisor: Helen Sheumaker

Abstract: Clay county has a variety of different ethnic groups that have located in this region. This project will focus on the Italian immigration into the area, particularly Dilworth. It will also take a look at the impact that the Italian's had on the beauty industry. This project is for the multicultural web museum and will outline the family history and the timeline of their success in the local beauty industry.

88

Title: Parent-Child Communication Program Case Study #2

Presenter(s): Heidi Kopel, Tracey Rufsvold

Department: SLHS

Advisor: Louis DeMaio

Abstract: This case study analyzed the effect of the Parent-Child Communication Program (PCCP) on a mother and child pair in which the child was diagnosed with a language delay. PCCP promotes child communication and language and was developed by Dr. Louis DeMaio. We analyzed the mother's use of questions before and after the training program.

89

Title: The Recent Changes in the Immigration and Asylum System of the United Kingdom and Their Detrimental Affects

Presenter(s): Aaron Shreve

Department: Political Science

Advisor: Andrew Conteh

Abstract: This presentation looks at the recent changes in immigration and asylum policy in the United Kingdom. Most of the changes have come about as a result of the Nationality, Immigration, and Asylum Act. I will discuss the reasons for change in policy, specific changes in policy, and the detrimental affects of the policy changes.

90

Title: Predictions in Daily Lives - Can They Be Justified?

Presenter(s): Virendra Tripathi

Department: Philosophy

Advisor: Ted Gracyk

Abstract: From a simple task of making the morning cup of coffee to driving to work, we all make innumerable predictions in our lives. More often than not, our predictions are right. But, rightness of a prediction need not justify the prediction. In a philosophical analysis, the groundings for predictions come apart. This presentation discusses the problems for predictions issuing from such a philosophical analysis and the choice of the route it takes.

91

Title: Developmental and Behavioral Ontogeny of Antipredator Behavior in Cichlid Larvae

Presenter(s): Bree L. Hamann, Anusha Mishra

Department: Biology

Advisor: Wisenden Brian & Ellen Brisch

Abstract: Cichlids are unusual among fishes in having prolonged care of their eggs and developing young for up to 6 weeks. This is an enormous investment because of the energy spent defending the young against predators, lost foraging opportunities, and lost opportunities to reproduce again until the brood of young reaches independence. The duration of brood care is determined by the antipredator competence of the young. Here, we use video playback analysis to measure the speed and distance of the startle response of convict cichlid, *Archocentrus nigrofasciatus*, young at increments of development. The degree of calcification is measured by developmental staining procedures, which produces a red coloration in bones and a blue coloration in cartilage. We correlate the capacity for behavioral avoidance of predator attack with the degree of calcification of the skeleton. We show that skeletal calcification determines antipredator competence in this species, and that, in turn, determines patterns of parental care. These data have implications for the evolution of egg size in cichlid fishes.

92

Title: Early Fraternal Organizations of Clay County

Presenter(s): James Sander

Department: American Studies

Advisor: Helen Sheumaker

Abstract: The projects goal is to analysis the impact of Early Civic Fraternities in Clay County. The project with examine how Clay county fit in to the national scheme of fraternal growth and how the county differed. The project will also look into the type of citizens that belonged to civic fraternities.

93

Title: Web Research: Advertising, Public Relations-Marketing, News, Television, and Radio Online

Presenter(s): Sarah Jane Smith, Jared Medhus, Tiffany Deutsch

Department: Mass Communications

Advisor: Regene Radniecki

Abstract: The year 2001 marked a pivotal milestone for the Internet. In that year over 50 million people in the U.S. were connected to the Internet from home. The Net had come of age, reaching critical mass as a communication medium in record time. Our study takes a look at how the mass media use the Internet and the World Wide Web. Specifically, we will focus on how traditional mass media — news outlets, the television and radio industries, and media professionals in the advertising, public relations, and marketing fields adopted the new medium and how they are using it to reach current and new audiences.

94

Title: How do MAPK/ERK Kinases Regulate Microtubule Spindle Formation?

Presenter(s): Sumeda Nandadasa, Ava-Gaye Simms, Akila Weerasekara

Department: Biology

Advisor: Ellen Brisch

Abstract: The mitotic spindle formation is the key process that allows the segregation of the newly replicated chromosomes into two poles. Microtubules (MT) are the key components of which the mitotic spindle is formed. Understanding Microtubule assembly is important to understanding spindle fiber regulation. In our study we are trying to understand how microtubule assembly is regulated, what key proteins are involved, what gives the signal for microtubule sub-particles to assemble and disassemble? In earlier experiments we have found that there are two key proteins involved and they are sized 44 and 48KD. By antibody tests we predict that these proteins are in the Mitogen Activated Protein Kinase (MAPK) family and Extracellular Receptor Kinase (ERK) family by using specific antibodies. By using a collaboration of protein assay techniques together with western blot techniques we plan to further analyze these two proteins and to identify them using protein micro sequencing.

95

Title: Investigating DNA Replication Origins in *C. elegans*.

Presenter(s): Jessica Heck, Diane Nelson

Department: Biology

Advisor: Michelle Malott

Abstract: In order to ensure that only one complete copy of the entire genome is accurately replicated before mitosis, DNA replication is initiated at multiple locations in the genome called replication origins. Replication origins are of great importance to the regulation of DNA replication and make it impressively efficient. These initiation sites must be uniformly distributed throughout the genome in order to replicate the entire genome within a limited time period. The human c-myc sequence may be involved in the regulation of replication initiation. The human c-myc gene is a proto-oncogene that has been extensively characterized with regard to promoter regulation and chromosomal structure. DNA replication has been demonstrated to initiate within a 2.4 kb region upstream of the c-myc gene in human cells growing in culture. In addition, these sequences, when put into a plasmid and transected into human cells, are able to direct the replication of the plasmid once per cell cycle. The ability of these sequences of DNA to initiate the replication of a larger piece of DNA, such as a plasmid independently of a chromosome, is referred to as autonomously replicating ability. The c-myc sequences allow plasmids to replicate independently of the chromosome, and are thus said to be autonomously replicating sequences (ARS). In order to more fully understand replication initiation in metazoan cells, we propose to examine the c-myc sequences that act as replication origins in the model organism *C. elegans*, a small nematode. *C. elegans* are an ideal organism for this type of study because their entire genome is sequenced and has been used extensively to study molecular processes and genetic activities. We intend to work to develop a method to study the initiation of DNA replication within a 2.4 kb fragment of the human c-myc gene using *C. elegans* as a model organism.

96

Title: Phenylephrine Activates Na⁺-H⁺ Exchangers via Bifurcating Pathways Involving RhoA and ERK as Downstream Effects of Different Protein Kinase C Isoforms

Presenter(s): Dave S. Ronderos, Anusha Mishra

Department: Biology

Advisor: Mark Wallert & Joseph J. Provost

Abstract: In Chinese hamster lung fibroblasts (CCL39), Phenylephrine (PE) activates both ERK and the Na⁺-H⁺ exchanger (NHE) to regulate stress fiber formation. PE activation of α 1-adrenergic receptors activates conventional isoforms of protein kinase C (PKC). Previous research from our laboratory indicates that PE addition leads to activation of RhoA in CCL39 cells. Additionally, general PKC inhibitors such as staurosporine and BIM have been shown to block both RhoA and ERK activity in cells treated with PE. Multiple PKC isoforms are differentially regulated by a variety of cell membrane receptors to control diverse cellular functions. The focus of this study was to determine which PKC isoform(s) are involved in the PE activation of RhoA and ERK. Using enhanced green fluorescent protein tagged-PKC isoforms, we investigated the ability of PE to stimulate PKC translocation using the conventional PKC isoforms α , β 1, β 2 and γ . Our experiments show that PE activates multiple PKC isoforms. This finding allows for the possibility that distinct PKC isoforms are responsible for the independent activation of ERK and RhoA. Dominant/negative PKC constructs and specific PKC inhibitors are also used to examine the potential role for different PKC isoforms in the regulation of the RhoA-ROCK pathway and the ERK pathway. Our research has also shown that activation of ERK, RhoA and NHE are all required for stress fiber formation by PE in CCL39 cells. Defining a role for multiple PKC isoforms in the regulation of stress fiber formation would dramatically improve our understanding of this process.

97

Title: Exploring the Roles of Nurse Practitioner in Rural Health Care

Presenter(s): Jessica Kleindl

Department: Nursing

Advisor: Donna Heald

Abstract: A look at the roles and importance of nurse practitioners in the rural health setting. How they improve care and benefit local hospitals, as well as, a look at obstacles they face.

98

Title: Advanced Optical Imaging-Experiences at looking through the world with different lenses (objectives).

Presenter(s): Austin McCoy

Department: Biology

Advisor: Ellen Brisch

Abstract: This talk will be a personal statement on my experiences helping to set up an advanced optical imaging set up in the biology department. I have learned many imaging techniques and Simple PCI software abilities. I also helped teach others how to use the microscopy set up and software. I will highlight the problems solving strategies I developed when working with this new technology.

99

Title: The United States Beer Industry

Presenter(s): Katie Kapsner

Department: Economics

Advisor: Oscar Flores

Abstract: This presentation discusses the United States Beer Industry. There will be an overview of the beer industry over the years, and a close look at the industry today. It primarily focuses on growth in exports and imports.

100

Title: Constitutionality of the USA PATRIOT ACT

Presenter(s): Nicole Elkin Elkin

Department: Political Science

Advisor: Andrew Conteh

Abstract: Overview of the USA PATRIOT ACT, as well as views of its constitutionality from sources including judges, senators, and professors. Also how this Act is seen from international organizations and other nation states.

101

Title: The Car Problem; Whether to Buy or Lease.

Presenter(s): Christian Bichler, Rachel Wasche, Binod Shrestha, Jayne Linstad

Department: Mathematics

Advisor: Ellen Hill

Abstract: Using dynamical systems to aid in the decision of buying or leasing a car. The benefits and drawbacks of each decision will be presented in the project. Also, the costs involved in each decision will be evaluated.

102

Title: Target: Upscale Discounting and Power Relationships

Presenter(s): Adam Sandbek

Department: Speech Communication

Advisor: Tim Borchers

Abstract: Research based paper discussing the implications of Target as an upscale discounter. A rhetorical criticism is conducted using Marxist principles with an attempt to better understand how Target's practices influence power relationships.

103

Title: Fraud in the United Way

Presenter(s): Kristin Bentz

Department: Accounting

Advisor: James Hansen

Abstract: I'll be talking about the fraud that occurred approximately two years ago in the United Way Foundation.

104

Title: Can Some Predators Avoid Being Chemically Labeled by Their Prey?

Presenter(s): Jeni Donner, Jodi Hendrickson, Courtney Rud

Department: Biology

Advisor: Brian Wisenden

Abstract: We know from previous studies that minnows can detect the diet of predators by chemical alarm cues in minnow skin that survive the digestive system of the predator. This chemical labeling should put pressure on the predators to mask or breakdown these signaling molecules to avoid alerting the prey of their presence and improving further success of the predator. We are testing two predators, the northern pike and the largemouth bass. Pike are known to be chemically leaky in that the prey can detect alarm substance of ingested prey; however bass have never been tested. Evolutionarily, bass are much more advanced than pike. But are bass as chemically leaky as pike, or do bass have a mechanism for blocking the effect of chemical labeling by minnow prey? We tested this idea on zebra danios in the laboratory by injecting into their tanks the alarm substance made up of the digestive wastes of the pike and bass on a diet of zebra danios or swordtails (a non-minnow species). AS controls, we used blank water, and undigested skin extracts of zebra danios and swordtails. We measured activity and vertical distribution, which commonly change during antipredator behavior. If the zebra danios respond to the bass on a zebra danio diet then we can conclude that bass give off a chemical label that can be detected by the prey. If the danios do not have a response to Bass on a danio diet, then we can conclude that they can block chemical labeling.

105

Title: Stars and Stuff: an Introduction to Astrophysics

Presenter(s): Eric Haverberg

Department: Physics

Advisor: Alison Wallace

Abstract: An introduction to the fundamentals of Astrophysics. Topics to include gravity, light and stellar evolution.

106

Title: Vetoing the Engenderment of the Frozen Human Embryo: A Feminist Argument for the Regulation of Reproductive Technologies and the Abolition of Forced Motherhood

Presenter(s): Amanda Easton

Department: Women's Studies

Advisor: Tracy Scholl

Abstract: This presentation will represent a feminist argument for the regulation of reproductive technologies and the abolition of forced motherhood.

107

Title: A Test of the Anti-Pathogen Hypothesis for the Function of Perciform Club Cells

Presenter(s): Shireen Alemadi

Department: Biology

Advisor: Brian Wisenden

Abstract: Minnows and other species in the group called "Ostariophysi" possess specialized club cells in their skin that release an alarm chemical when the minnow is injured in an attack. Members of the evolutionary advanced perch family (non-Ostariophysans) possess similar cells that arose independently from the minnow line of fish evolution. These cells in both groups present a problem to evolutionary biologists because it is not clear how individuals that invest in these cells benefit from the costly investment in these cells. Other individuals benefits from the alarm signal when they die, but why do these fishes make the cells in the first place? In addition to antipredator responses, some researchers speculate that these cells may play a roll as an antipathogenic agent (against skin parasites), or in protecting the fish from the adverse effects ultraviolet (UV) radiation. Both parasitism and UV exposure increases the rate of healing of damaged tissue in exposed locations. We tested for the effect of skin parasitism on the proliferation of club cells in yellow perch, *Perca flavescens*. The amount of club cells and mucus cells present on the back of the neck (nape) and side (flank) increased with increases in the degree of parasitism. We also compared the distribution of club cells on different parts of the body. Results showed that club cell density was highest on the nape, intermediate on the flank, and least numerous on the bottom. The same result was also seen in the number of mucus cells in each section of fish. These data provide support for a healing function of club cells. Club cells were most abundant in the nape where UV radiation is most intense, and club cells were most abundant in fishes exposed to high rates of parasitism.

108

Title: Portrait Drawing Demonstrations: Methods and Meanings

Presenter(s): Katie Semelis, Valerie Mikelson, Mika Takahashi, Jennifer Lindeman

Department: Art and Design

Advisor: Sherry Lee Short

Abstract: This dynamic portrait drawing demonstration will be presented by four students from the Department of Art and Design. Every 15 minutes of the first hour, one of the students will give a formal presentation on her work, including its historical influences, style, and intent. The second hour will be an informal, open session; as the work is being completed, visitors are invited to observe, ask questions, and view other examples of the students' finished work.

109

Title: NMR Study of Magnetic Molecules

Presenter(s): Moneer Al-Rifai

Department: Physics

Advisor: Ananda Shastri

Abstract: This presentation is based on an internship at Ames Lab, IA where we studied the nuclear magnetic resonance behavior of magnetic molecules. Our research focused on studying the proton NMR of these magnetic molecules (V12) at different magnetic fields and different temperatures (4.2-300K). To analyze this behavior, it is important to understand how the spin dynamics and the spin relaxation rate depend on the magnetic field and temperature.

110

Title: Mental Retardation

Presenter(s): Maggie Mork

Department: SLHS-Speech Language, Hearing Communications

Advisor: Louis DeMaio

Abstract: Mental retardation (MR) is defined as having substantial limitations in present functioning. People with MR can be further diagnosed as having mild, moderate, severe, or profound severity. Language is one of the most impaired areas for a child with MR. They have issues with pragmatics, semantics, syntax/morphology, phonology, and comprehension. Their difficulty in these areas depends on their severity. The possible causal factors for MR include biological, social-environmental, and processing factors. In conclusion, mental retardation is a very complex diagnosis that is often misunderstood.

111

Title: Digital Manipulation, Has it gone to Far?

Presenter(s): Aimee Imdieke

Department: Mass Communication

Advisor: Martin Grindeland

Abstract: My presentation will be on the the issue of digital manipulation. I will be speaking about the extremes that this issue has been taken to, and the opinions and ethics behind it. I will be presenting examples of various kinds of manipulations to correspond with my presentation, to help aid the audience in understanding the issue.

112

Title: Form Follows Function: Why Animals Look the Way They Do

Presenter(s): Rachael Smith, Jon Frykman

Department: Biology

Advisor: Alison Wallace

Abstract: This workshop will be an activity exploring evolution as a high school life science student would experience it. Hands-on activities and discussions will cover topics such as natural selection and genetics.

113

Title: Reproductive Ecology of Fathead Minnows (*Pimephales promelas*): The Effect of Nest Type on Reproductive Success

Presenter(s): Shireen Alemadi, Greg Grawunder

Department: Biology

Advisor: Brian Wisenden & Michelle Malott

Abstract: Animal mating systems include monogamy (M:F), polygyny (M:FF), polyandry (MM:F) and promiscuity (MM:FF). Here, we report preliminary findings of our study of variation in the mating system of a promiscuous fish, the fathead minnow (*Pimephales promelas*). Males establish a territory under submerged sticks or floating objects, chase away rival males and court females. Successful males may receive eggs from several females, and each female may deposit eggs in more than one nest. Males eat little during this time and often resort to eating their own eggs to sustain themselves. For this reason, females prefer to lay eggs in nests that already contain eggs. New, fresh males can therefore sire more eggs if they evict the half-starved resident male of a nest that contains eggs, than if they start a new nest on their own. We studied a population of fathead minnows in Budd Lake, MN, in Itasca State Park. We found that the type of nest strongly influenced the number of eggs received. Nests formed on the underside of lily pads contained significantly more eggs than nests formed on the underside of submerged sticks. Lily pad nests offered much more surface area for egg deposition. Eggs in lily pad nests were typically deposited in a single layer whereas eggs on the underside of sticks were often glued to each other in multiple layers. Stacking eggs would limit access to oxygen and potentially hinder egg development and hatch success. Male-male fighting was observed frequently, particularly around lily pad nests. We hypothesize that lily pad nests are more likely to contain eggs sired by multiple males due to nest takeovers. To test for multiple paternity, we developed DNA fingerprinting methods that we will eventually use to match the DNA of the male guarding the nest with the DNA of the eggs contained in his nest.

114

Title: The Wine Industry

Presenter(s): Meridith Sanders

Department: Economics

Advisor: Oscar Flores

Abstract: This presentation will take a look at the present state of the wine industry and the changes that have been taking place.

115

Title: Mothers and unfair pre-natal care.

Presenter(s): Erika Stein, Gretchen Omdahl

Department: Sociology

Advisor: Sue Humphers-Ginther

Abstract: Our presentation will demonstrate the difficulties of obtaining adequate pre-natal care based on different factors such as age, race, and ethnicity.

116**Title:** Fraud: How to Make a Million Stealing from Your Employer**Presenter(s):****Department:** Accounting**Advisor:** James Hansen**Abstract:** Fraud costs U.S. businesses \$600 Billion a year.

Fraud schemes will be discussed, such as the outrageous "Crazy Eddie \$120 Million Rip-off", which included all five principle types. The accounting profession's reaction to fraud will also be detailed.

117**Title:** Expression of Mitochondrial Genes in Wheat (*Triticum aestivum* L.)**Presenter(s):** Pabalu Karunadharma**Department:** Biology MSUM & Plant Sciences NDSU**Advisor:** Khwaja Hossain & Shahryar Kianian

Abstract: Nuclear and organelle genomes in plants play an important role in expression of productivity traits. The sub cellular genomes - mitochondria and chloroplast - only code for a small number of genes but they are unique and irreplaceable for the regulation of the cellular processes in plants. Mitochondria is the center for energy synthesis and serves essential functions in the development of the plant. Mutations of mitochondrial genes lead to many changes in the plant development such as cytoplasmic male sterility (CMS) which is observed in as many as 150 plant species. Also there are many conserved sequences among the mitochondrial genomes of plant species. Wild species is the usual reservoir of genes for improvement of pest resistance, grain quality and agronomic fitness of any cultivated species. The genes affecting nuclear-cytoplasmic (NC) interactions seem to affect gene transfer from wild to a cultivated species. Analysis of gene expression in mitochondria will provide valuable information in understanding these NC interactions in the cell. So far seventy-eight mitochondrial genes have been identified in wheat. These genes are identified from several cDNA sequences. The purpose of this study is to isolate these mitochondrial genes and compare them with other mitochondrial genomes from grass species such as rice and maize

118**Title:** The Conversion of MDH to LDH Through Site Directed Mutagenesis**Presenter(s):** James Denker, Andy Thompson, Castel Santana**Department:** Biology**Advisor:** Joseph Provost

Abstract: Malate Dehydrogenase (MDH) is an enzyme that is involved in the pathways of the Krebs Cycle, carbohydrate, fatty acid, and amino acid metabolism. The role of MDH is to catalyze the reduction of oxaloacetate (OAA) to malate via oxidation of NADH to NAD⁺. Lactate Dehydrogenase (LDH) is a glycolytic pathway enzyme, which catalyzes the conversion of pyruvate to lactate. Upon alignment and examination of the amino acid sequences of yeast, and watermelon MDH isoforms, we found that their active site amino acid residues 102 and 171 are conserved. When the sequences of these isoforms are aligned with that of *Bacillus stearothermophilus* LDH (BsLDH) differences were found at or near these key sites (102:MDH-arginine, LDH-glutamine; 170: MDH-valine, LDH-alanine; 172: MDH-alanine, LDH-phenylalanine). The goal of this project is to shift the substrate specificity of yeast and watermelon MDH isoforms through saturation mutations, which should result in nearly every possible amino acid substitution at each of these key sites. A shift in substrate specificity from OAA to pyruvate, will in essence, convert MDH into LDH. Mutants of the yeast, and watermelon MDH will be constructed using the Stratagene Quickchange mutagenesis kit employing degenerate oligos with a highly efficient, long range polymerase to create site directed mutants for both the yeast mitochondrial and watermelon glycoxosomal isosymes. The resulting mutants will be assayed for specific enzyme/substrate interactions (MDH functioning vs. LDH functioning). We will develop a nitrocellulose filter assay system or, alternatively, we will create a stop time, spectrophotometric enzymatic assay to measure the catalytic rates of the reactions. Once mutation has been obtained, a Sanger-dideoxy DNA sequencing reaction will be performed in order to confirm the amino acid changes made to the resulting mutants and the specific kinetic changes in the mutants will be measured.

119**Title:** Parent-Child Communication Program**Presenter(s):** Lisa Fanfulik, Tracy Klassen**Department:** Speech-Language-Hearing Sciences**Advisor:** Louis DeMaio

Abstract: Parents play a crucial role in facilitating communication and language development in their child. A child's parent is usually their first communicative partner, so ideally they would speak with their child in a way that aids language rather than impedes it. In order to facilitate language development in a language-impaired child, it is important that parents "tune in" to their own communication style. For this reason, many therapy programs for language-impaired children are giving parents a central role in therapy. Teaching parents more effective ways of communicating with their child helps facilitate language development.

120

Title: The role of NHE1 in Balb-c rat tumorigenesis

Presenter(s): Hillary Thronson

Department: Biology

Advisor: Joseph Provost

Abstract: The sodium hydrogen exchanger (NHE1) is an ion transport protein with a wide variety of functions, one of which is intracellular pH regulation. Aberrant NHE1 activity can facilitate both tumor formation and metastasis by changing the internal and external environments of a cell. This study will attempt to determine if there is a correlation between exchanger function and tumorigenesis in Balb-c rats using cell lines with varying levels of NHE1 activity. CCL39 cells have normal NHE1 activity, while PS127 cells overexpress NHE1 and PS120 cells completely lack the exchanger. Previous studies have shown that an aggressive cell line (DMS 114) derived from a human pulmonary carcinoma will cause tumor formation in nude mice when injected into mammary fat pads (Waalkes, Bhalchandra). This study will use a similar cell line (DMS 79) derived from a pulmonary carcinoma as a positive control. Groups of rats will be injected subcutaneously with one of the aforementioned cell lines and sacrificed two and four weeks after injections to detect the presence and severity of tumors throughout the animals' bodies.

121

Title: Rape as a Weapon of War: Reproductive Issues Concerning Women in War

Presenter(s): Shannon Crabtree, Gwen Goos, Amanda Easton

Department: Women's Studies

Advisor: Tracy Scholl

Abstract: Paper addressing the issue of women's reproductive rights and women as a weapon of war.

122

Title: Growth Curve of Staphylococcus Epidermidis

Presenter(s): Sonnia Ranguma

Department: Biology

Advisor: Kathryn Wise

Abstract: The presentation will show the experiments I did on determining the growth and generation time of staphylococcus epidermidis at 37 degrees. The poster will show the procedure I used and the what I observed in order to come up with a growth curve showing all the different phases.

123

Title: The Implications of Selective Abortion in the Case of Disability: Integrating Disability Right and Reproductive Freedom

Presenter(s): Gwen Goos, Shannon Crabtree

Department: Women's Studies

Advisor: Tracy Scholl

Abstract: This will be a panel discussion on 3 papers written by Women's Studies Seniors all on the subject of Reproductive Rights. My portion of the discussion looks at selective abortion in the case of disability and what consequences abortions of this type have in the social context.

124

Title: Signature Quilt

Presenter(s): Hannah Mische, Jindallay Simmons

Department: American Studies

Advisor: Helen Sheumaker

Abstract: We will be researching and visually documenting a signature quilt. Information will be compiled for a historical web site. We will be documenting the ethnicity and occupations of the creators of this community signature quilt.

125

Title: Cost/Benefit Analysis of a Twins stadium in Minneapolis

Presenter(s): Ian Perkins

Department: Economics

Advisor: Oscar Flores

Abstract: I am going to see what the cost and the benefits are going to be to the city of Minneapolis, if its Twins stadium project is approved by the state government

126

Title: French Settlement in Clay County

Presenter(s): Trevor Cook

Department: American Studies

Advisor: Helen Sheumaker

Abstract: Both French Canadian and French nationals settled in Clay County, Minnesota, since the county's origin. I will report on the impact that each of these groups has made in shaping the county.

127

Title: Sports Economics

Presenter(s): Jeremy Tweed

Department: Economics

Advisor: Oscar Flores-Ibarra

Abstract: I will be identifying the costs, benefits, and the economic impact of a city that decides to build a new sports venue in a downtown area.

128

Title: Racing Through Time: A Historical Look at Horses in Clay County

Presenter(s): Kayla Muehler

Department: American Studies

Advisor: Helen Sheumaker

Abstract: From racing on the frozen Red River to aiding in plowing fields, horses were an integral part of life in Clay County. Prior to automobiles, people depended on horses for labor, transportation, and entertainment. This presentation will focus on artifacts, photographs, and the history of horses in the Red River Valley.

129

Title: Genocide and the Normality of the Perpetrators of Evil

Presenter(s): Bruce Ringstrom

Department: History

Advisor: Dieter Berninger

Abstract: The vast majority of genocide participants are ostensibly normal people, who embrace the moral precepts of their culture. Yet their actions as perpetrators accord with neither their normality nor their moral precepts. This paper explores the mechanics of transforming average people into participants of genocide.

130

Title: Rates of Groundwater Cadmium Attenuation in Gravels Impregnated with Glacial Clay in the Red River Valley

Presenter(s): Michele Lhotka

Department: Anthropology and Earth Sciences

Advisor: Russ Colson

Abstract: Cadmium is a naturally occurring metal that is used industrially in batteries, ceramics, and dental materials. It can also be found in cigarettes, coffee, tea, refined foods, water pipes and others. Cadmium is toxic when present in high levels to all mammals. It is most toxic when inhaled and is a probably carcinogen to humans and animals. Cadmium gets deposited in soils from improper disposal and because it naturally occurs in the Earth. The experiment reported here examines how cadmium concentrations in an aqueous solution will change with time due to reactions with sediment. Glacial till from one of the most recent deposits was collected from the Buffalo River Regional Science Center. Cadmium chloride aqueous solutions will be exposed to glacial till and gravel for times varying from one day to ninety days. We plan to measure the decrease in cadmium concentration with time as a means to establish how rapidly cadmium attenuation might occur in natural aquifers in the Red River Valley. The results will be presented at the conference.

131

Title: NMR Line Widths as a Signature of Crystal Geometry and Dynamics.

Presenter(s): Megan Sawarynski

Department: Physics and Astronomy

Advisor: Joe Ross (Texas A&M)

Abstract: A poster presenting the research that was developed during my summer 2004 internship with Texas A&M's Institute for Quantum Studies. We were looking at Type I Clathrates to determine where the elements "sit" in the cage-like structure by using the line shapes and the relaxation times of two samples.

132

Title: Spectroscopy and the Spectroscope

Presenter(s): James Herman

Department: New Center

Advisor: Dennis Jacobs

Abstract: This presentation will focus on the relevance and use of spectrosopes in human society, beginning with the earliest times to the present. It examines the study of spectroscopy in contemporary society, and provides some projections of possible future trends. The presentation will also include a demonstration of the use of a spectroscopy.

133

Title: Women's Empowerment

Presenter(s): Jessica Sletten

Department: Political Science

Advisor: Andrew Conteh

Abstract: There are many different discussions about rights, especially the rights of women. What does this really mean? What are the real goals of women's rights and how far do they really extend? Today I will take a look at women's rights and the different aspects of this concept. Such as, what women's rights are and what has been done to protect them. Also, what are some of the problems faced with implementing these rights and problems faced by the women fighting this battle. These are some of the issues not widely talked about or as often as they should be. Hopefully with awareness this will become a larger topic of debate and with debate something greater will be done about this issues, and true liberation of women can be reached.

134

Title: Colorful History of Moorhead School: Oak Port.

Presenter(s): Janet Hohenstein, Vusya Bentley

Department: American Studies

Advisor: Helen Sheumaker

Abstract: This presentation will touch upon the ethnic, language, student population and historical background of Oak Port School in Moorhead, Minnesota. We will encompass the effect on specific background culture and what teaching they used to pass on their culture. Students with many backgrounds have been taken for granted in the United States as a whole. However, the history of Oak Port School portrayed it otherwise.

135

Title: Gender Differences in Physical, Verbal, and Social Bullying of Elementary Students

Presenter(s): Jacqueline Hendricks

Department: Counseling and Student Affairs

Advisor: Patricia Neuman

Abstract: The presentation will provide an overview of gender research related to bullying behavior in school children and highlight the results of my thesis project, which examined the gender differences in physical, verbal, and social bullying behavior in upper elementary students. In addition, the influence of gender on admission to bullying and willingness to inform school professionals about violent incidents was examined.

136

Title: Shakespearean Theatre

Presenter(s): Samantha Pudil, Alissa Blaeser, Cole Flaatt

Department: Theatre

Advisor: Theresa Carson

Abstract: Look back on who Shakespeare was, what his plays were like and what he did for theater as a whole. There will also be a short scene performed

137

Title: Special Problem in Education: Reaching Out to Adopted Minorities

Presenter(s): Heidi Holmberg

Department: Multicultural Studies

Advisor: Helen Klassen, Dr.

Abstract: I will prepare a poster presentation on the problem of reaching out through the school system to children who have been adopted by a family of a different ethnic background. How should one give them pride in their heritage and in who they are without alienating them, their family, or their classmates? How does one teach these children that they are special without making them feel even more isolated, especially in a community that is predominantly white? These are questions that will be answered.

138

Title: Marxism, Revolution, and Reform

Presenter(s): Peter Montecullo

Department: Philosophy

Advisor: Randy Cagle

Abstract: Karl Marx believed that capitalist oppression was to be overthrown, and subsequently superseded by communism, wherein oppression is eliminated. However, there is much debate about the way in which such a task can be actualized. In fact, the debate focuses on whether revolution or reform is the best way in which to bring about communism. In this presentation, I will explain Marx's position along with demonstrating why it is that revolution presents a better case for actualizing the communist goal.

139

Title: Child Labor

Presenter(s): Njeri Mwangi

Department: Political Science

Advisor: Andrew Conteh

Abstract: My paper is on child labor. It defines what child labor is and the different forms that exist. It also looks at what the United Nations along with the International Labor Organization are doing to eliminate child labor all over the world.

140

Title: China's One Child Policy: The Changing Face of Family Planning

Presenter(s): Brandon Sherman

Department: East Asian Studies

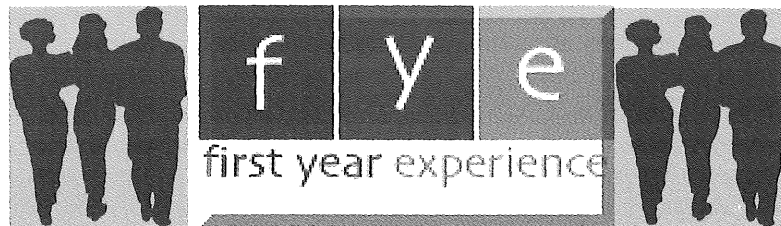
Advisor: Henry Chan

Abstract: A common problem facing developing countries today is the taxes on resources caused by overpopulation. China holds the distinction of a negative total fertility rate (TFR), which is generally found only in developed countries such as the United States of America and Germany. The reasons for China's negative TFR, however, differ from those of developed countries. This presentation will examine the historical development of family planning policy in China and the structure and methods of its implementation. It will discuss some of the failures and successes of the policies, and address some of the international dialogue concerning the policies. Lastly, it will discuss some of the reforms that the policies have undergone in the last decade. Ultimately, the presentation hopes to provide an introductory overview of the family planning in China and the "One Child" policy.

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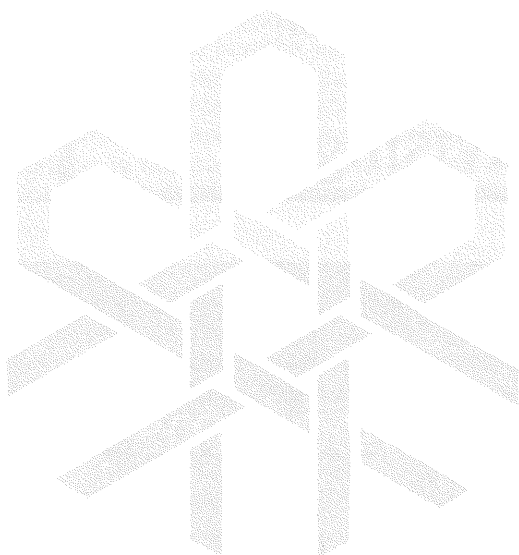
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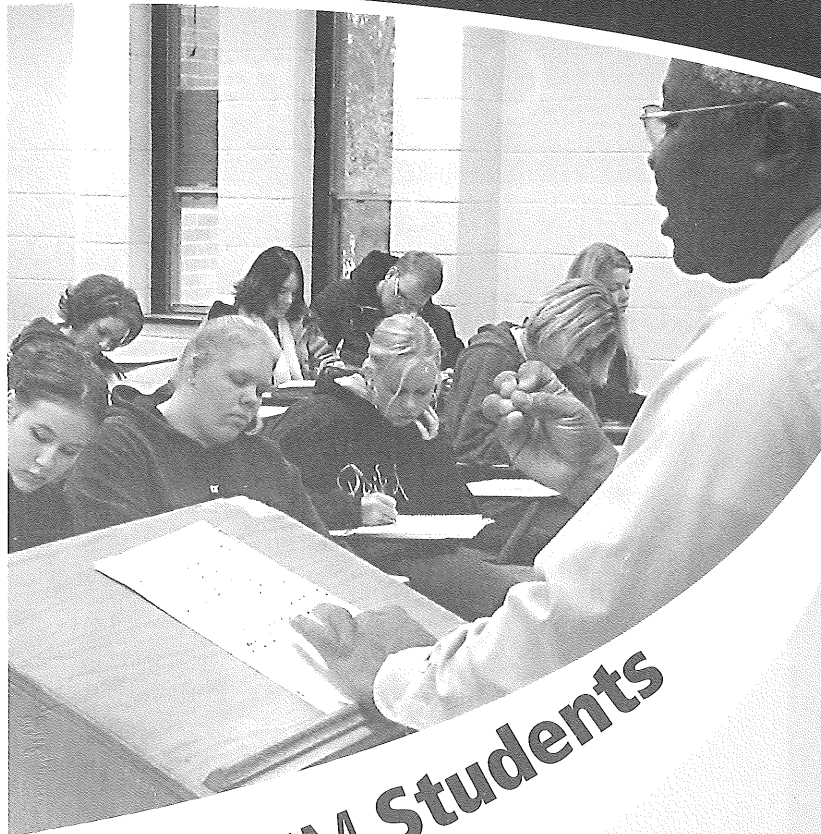
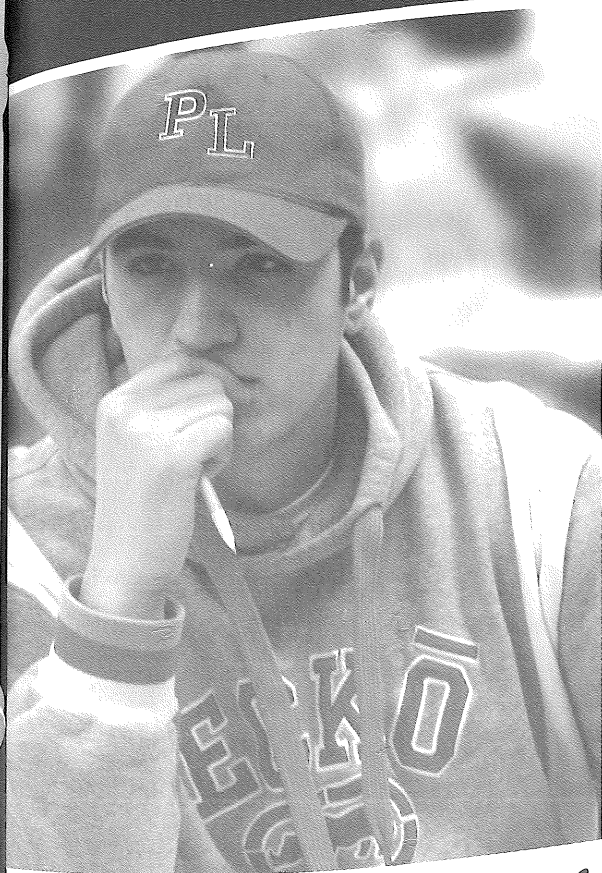
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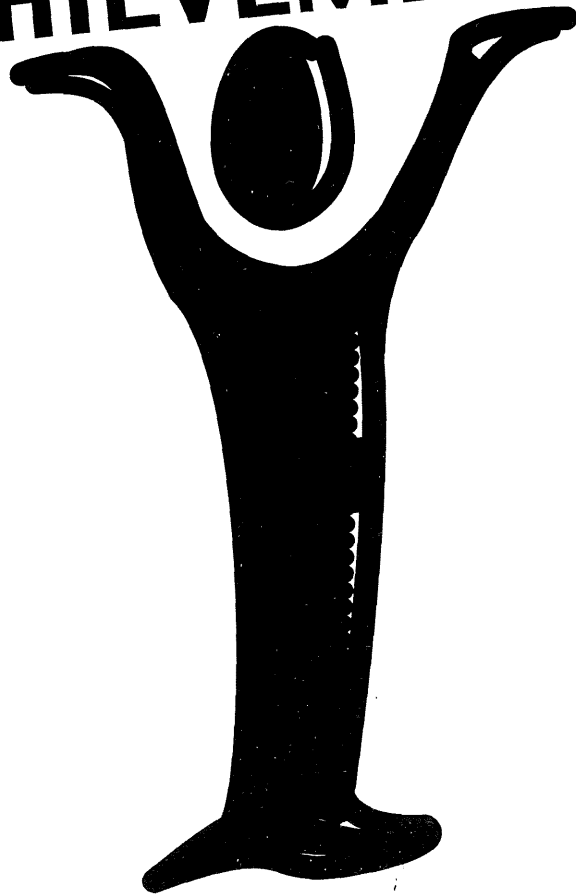
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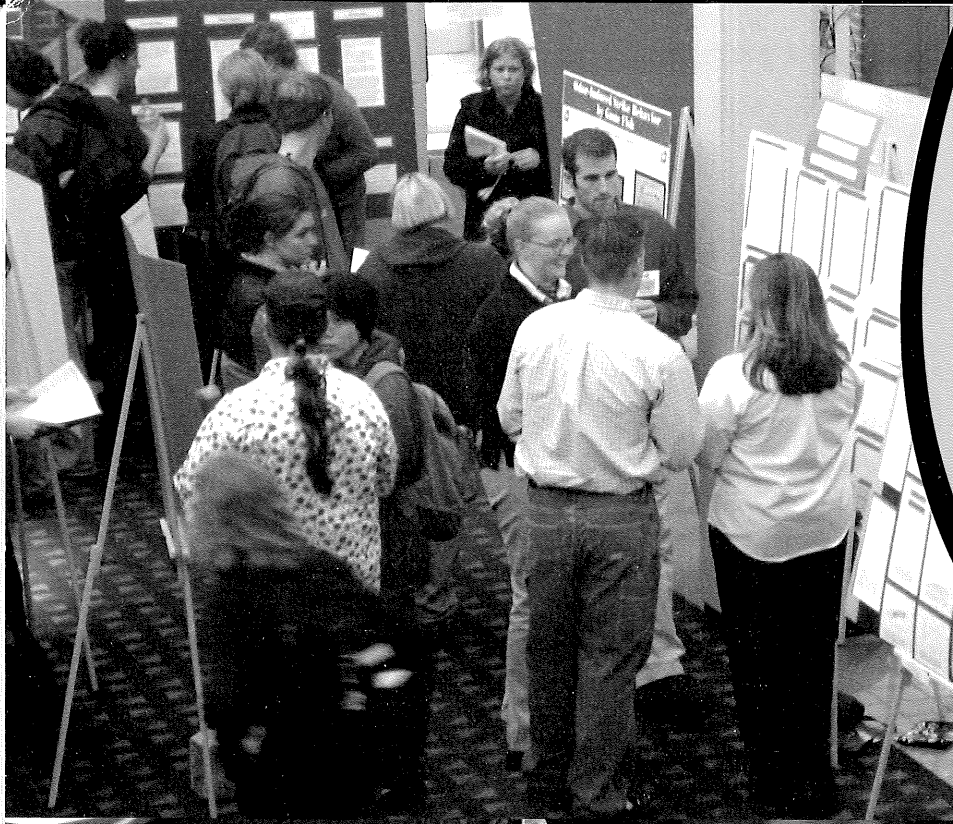
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Biochemistry and Biotechnology Emphasis

A Presentation to the Honorable Members of the
Minnesota House of Representatives Higher Education Finance
Committee on:

Monday, February 21, 2005

To the Honorable Members of the Minnesota Senate Education
Committee on:

Tuesday, February 22, 2005

To the Honorable Members of the Minnesota Senate Higher
Education Finance Committee on:

Thursday, February 24, 2005

Thank You!

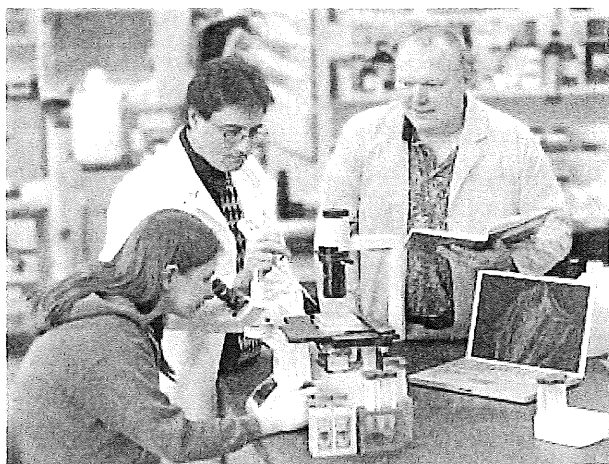
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The New Science Laboratory Facility is simply outstanding. The facility is providing unprecedented opportunities for enhanced science education and continued growth in the natural sciences at MSUM.



We look forward to the funding for the renovation of Hagen Hall that will complete the update of the science complex.



MSUM Faculty Presenters



MSUM President Roland Barden and the Dean of Social and Natural Sciences Dr. Ronald Jeppson accompanied Biochemistry and Biotechnology Faculty Members Drs. Michelle Malott, Mark Wallert, Ellen Brisch, and Joe Provost to the MnSCU Award Presentation in March 2003.

Dr. Mark Wallert. Dr. Wallert is a Minnesota native. He received his Bachelor's Degree from Southwest State University. Dr. Wallert's Ph.D. is in Physiology from Emory University in Atlanta, Georgia in 1989. He was then a Postdoctoral Research Fellow in the Pharmacology Department at the Mayo Clinic. He has been a member of the MSUM Biology Department since 1990. He teaches the first course for biology majors, Cell Biology, and is instrumental in helping new students transition into the department. Dr. Wallert converted the Cell Biology Laboratory to an investigative format during the 1995-96 academic year. Dr. Wallert also teaches Human Physiology a junior level course in the Health and Medical Science Emphasis. In the senior Biotechniques sequence Dr. Wallert teaches cell culture and transfection as well as supervising a research group. Dr. Wallert has chaired the Biochemistry and Biotechnology (B&B) Oversight Committee since its inception in 1997. He has been a major driving force for the incorporation of research into undergraduate education at MSUM. He has been the principle investigator on three NSF-CCLI proposals to enhance teaching in the B&B Emphasis. Dr. Wallert is a member of Project Kaleidoscope Faculty for the 21st Century and is a member of the Education and Professional Development Committee for the American Society of Biochemistry and Molecular Biology. Over the past three years, Dr. Wallert has consulted for the North Dakota Biomedical Research Infrastructure Network. During that time he has co-presented four workshops teaching faculty members from the four-year and tribal college in North Dakota how to incorporate research-based, investigative laboratories into their curriculum. Dr. Wallert also maintains an active research program. In the past 15 years, Dr. Wallert has had 58 different students participate in research obtaining a total of 91.5 years of research experience. Of the 34 students who have graduated from Dr. Wallert's laboratory, 27 have continued on to graduate or professional school. Collectively, these students have been co-authors on 4-refereed publications, 14 nationally presented abstracts and 29 abstracts at the Minnesota Academy of Sciences. Dr. Wallert has received nearly \$1,300,000 in grant support while at MSUM.

Dr. Ellen Brisch. Dr. Brisch earned her BA in Biology from Oberlin College in 1985, spent five years working as a chef in the Boston area, returned to graduate school to earn a Ph.D. at the University of Kansas in Physiology and Cell Biology in 1995, and was a postdoctoral fellow at the University of Utah from 1996 to 1999. Dr. Brisch was able to attend the Analytical and Quantitative Light Microscopy course at Marine Biology Laboratory at Woodshole MA this past summer. Dr. Brisch joined the Biology Department in the fall of 1999 to start up a Developmental Biology course. Dr. Brisch's research interests are in cell division; specifically in understanding how mitochondria are coordinated and segregated during cell division and also how microtubule assembly is regulated after fertilization. Dr. Brisch is developing collaboration with Dr. Margaret Titus at the University of Minnesota and works two weeks over the summers in her lab. Dr. Brisch teaches Cell and Vertebrate Systems Physiology and Developmental Biology for biology majors, Human Biology for non-majors, Biology of Women which is cross-listed with Women's Studies, and participates in the Biotechniques research courses by teaching a microscopy section and working with a research group. In addition to her courses and research, Dr. Brisch is very active on campus and serves on many University and Programmatic committees. Dr. Brisch's dedication to the value of a liberal arts education has helped her to earn the chair of the University's Liberal Studies Committee.

Dr. Michelle Malott. Dr. Malott has been a member of the MSUM Biology Department since 2001. She earned her B.A. in Biology from the University of Windsor in 1990 and her Ph.D. in Biomedical Sciences from Wright State University in 1999. She spent a year as a Postdoctoral Scientist in the Cancer Research Division at Eli Lilly and Co. Her interests as a young undergraduate researcher were in the area of evolutionary biology. These interests broadened into the biomedical sciences when she was a graduate student, as her doctoral work focused on mechanisms regulating DNA replication initiation in mammalian cells. She decided to focus on an undergraduate teaching career at an institution that would support the use of research as a teaching tool in the training of young scientists and was hired by MSUM to do just that. She teaches a junior-level molecular biology course and is actively involved in the B&B emphasis and regularly supervises a group of senior research students in the B&B capstone course. She also is responsible for the sophomore-level genetics class and regularly teaches one of the department's non-major biology classes. She works hard to make the labs associated with her classes, current, relevant and investigative. In addition to her teaching responsibilities, Dr. Malott also maintains an active research program that supports ~ 6 students each year in extracurricular research projects. Her interests and expertise in the molecular area remain broad and her students are involved in both biomedical and molecular ecology research projects. She has been successful in obtaining both internal and external funding to support her research program and is a strong advocate for developing and maintaining collaborative research efforts at MSUM. Dr. Malott also enthusiastically believes in the mission of increasing the participation of under-represented students and women in STEM areas and is involved in a variety of outreach activities to support this.

Dr. Joseph Provost. While teaching 12 contact hours a semester, advising students and being involved throughout campus and the community on many committees, Dr. Provost has maintained a successful research program where he has been funded with over \$800,000 in awards from the Autism Foundation, the National Science Foundation, the National Institutes of Health and the State of Minnesota. For the past eight years Dr. Provost focused on how G protein coupled signaling pathways cross-talk to signal to growth factor cascades. A new direction that his laboratory has begun is in Autism. In 40-60% of diagnoses, Autism patients are deficient in Tuberous Sclerosis Complex. This is a newly discovered protein that can activate two pathways that both lead to NHE regulation. In all of these efforts undergraduates are fully involved in all phases of the experimentation. Dr. Provost is an active member of Project Kaleidoscope Faculty for the 21st Century. Last year he helped facilitate a North Dakota Biomedical Research Infrastructure Network / Project Kaleidoscope workshop for the North Dakota four-year and tribal colleges on teaching investigative laboratories and incorporating research into the undergraduate curriculum. Dr. Provost is on the board of directors for the Minnesota Academy of Science and is a regular organizer for the Academies Annual Meeting. Dr. Provost also serves as the Northwest Regional Co-Directors for the American Society of Biochemistry and Molecular Biology (ASBMB) Undergraduate Biochemistry and Molecular Biology project. In this position Provost and Wallert are responsible for the coordination of resources for biochemistry and molecular biology courses in the Upper-Midwest. At the 2004 and 2005 ASBMB meeting Dr. Provost is one of the organizers for the undergraduate poster session and is a working member of the ASBMB Educational and Professional Development Committee. The primary purpose for faculty members at MSUM having ongoing research projects is to provide undergraduates a meaningful research experience. In the past six years Dr. Provost has had 28 different students participate in research for a total of 53.5 years of research experience. Of the 18 students who have graduated from Dr. Provost's laboratory, 14 have continued on to graduate or professional school. Collectively, these students have been co-authors on 5-refereed publications, 21 nationally presented abstracts and well over 50 abstracts at the Minnesota Academy of Sciences or Tri Beta Meetings.

Undergraduate Student Presenters from the MSUM Biochemistry and Biotechnology Emphasis:

Jessica Heck. Jessica is a senior Biochemistry and Biotechnology Major from Moorhead, Minnesota. She will graduate in May 2005. Jessica has been accepted into the Molecular and Cellular Pharmacology program at the University of Wisconsin – Madison. She plans to pursue a Ph.D.

Dylan Voge - Dylan is a senior Biochemistry and Biotechnology Major from Wadena, Minnesota. He will graduate in May 2005. Dylan has been accepted into the University Of Minnesota Duluth School Of Medicine.

Kathleen (Kit) Mitchell – Kit is a junior Biology Major from Wayzata, Minnesota. Kit is interested scientific writing, particularly in the area of science policy.

Rachel Sang – Rachel is a junior Biochemistry and Biotechnology Major from Steven, Minnesota. Rachel is a Goldwater Scholar who plans to pursue and M.D./Ph.D. following graduation from MSUM. Rachel is planning to do summer research at the University of California San Francisco this summer.

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- M.D., Master's, and Ph.D. Programs

University of Minnesota

- Goal to be one of the top three public research universities in the world in the next 10 years.
- Focus is Graduate and Professional Education
- Undergraduate Education is Traditional

MnSCU

- Focus is Technical and Undergraduate Education
- Enrollment is 240,000 students per year in credit-based courses
- 130,000 per year in non-credit courses.
- 30,000 graduates per year.



Successful and Contributing Graduates of the Minnesota State University System

- Dr. Mark Wallert is from Danube, Minnesota and received his Bachelor's Degree from Southwest State University.
- Dr. Joseph Provost is from Blaine, Minnesota and received his Bachelor's Degree from Bemidji State University.

Minnesota State University Moorhead

- Primarily Undergraduate Institution
- 7,800 full- and part-time students
- Students enroll in one of 90 programs and receive majors that lead to baccalaureate degrees.
- Dedicated to providing the highest quality education possible at an affordable price.

Academic Year	98/99	99/00	00/02	02/02	02/03	03/04
MSUM Students	6,102	6,308	6,707	7,044	7,048	7,265
Grads	1,072	1,057	1,099	1,183	1,092	1,297
Biology Majors	250	262	233	246	272	299
Grads	38	41	41	37	44	48
Chemistry Majors	32	51	67	84	90	109
Grads	4	6	8	11	13	18
B&B Emphasis		18	35	40	52	61
Grads		4	5	7	11	13



Natural Sciences at MSU Moorhead

The Regional Comprehensive University has a Unique Role in undergraduate science education in Minnesota.

Combines the best educational opportunities from a Major Research Institution with those from Small Independent Colleges.

- Provide broad-based liberal studies experience
- Provide small class size
- Focus is on undergraduate education and quality student-faculty interactions
- Provide students access to a comprehensive science curriculum
- Provide expanded research opportunities.
- All laboratories are taught by faculty members

Biology professor Dr. Ellen Brisch is the chair of the MSUM Liberal Studies Committee

Unique to the MSUM Model

- A coordinated science curriculum with research-based, investigative laboratories initiated in year one freshman courses through advanced senior-level courses
- Research experiences for undergraduates directly mentored by Ph.D. faculty.

Drs. Joe Provost and Mark Wallert are both Associate Editors of the Journal of Biochemistry and Molecular Biology Education.

Dr. Chris Chastain regularly reviews manuscripts for the Journal of Plant Physiology.

The MSU Moorhead Model of Biosciences Education

Over the past ten years, faculty members from MSUM have participated in the national debate about the need for reform in undergraduate education through participation in Project Kaleidoscope (PKAL) Faculty for the 21st Century. PKAL states that the most important attributes of undergraduate programs that attract and sustain student interest in science and Math is a thriving natural science community of students and faculty. This is demonstrated by a commitment to:

- 1) Experiential, hands-on, and investigative learning throughout the curriculum from introductory to capstone courses*
- 2) Learning that is personally meaningful to students and faculty, makes connections to other fields of inquiry yet, embedded in the context of its own history and rationale, and suggests practical applications relevant to students.*
- 3) Learning that takes place in a community where faculty are committed equally to undergraduate teaching and to their own intellectual vitality, where faculty see students as partners in learning, where students collaborate with one another and gain confidence that they can succeed.*

The Faculty of the MSUM Biochemistry and Biotechnology Emphasis received the MnSCU Academic and Student Affairs Division Excellence in Curriculum Programming Award in 2003. This is the only academic excellence award given in the MnSCU System annually.

The Biology Department at MSUM has created an exciting learning environment that includes research-based, investigative experiences and faculty-student interactions that foster meaningful and vital collaborations.

In September 2003, the Biology Department underwent an external review by Dr. Randy Moore. Dr. Moore is Professor in the General College at the University of Minnesota, current editor-in-chief of the *American Biology Teacher*, and a nationally recognized expert in undergraduate science education. In his report, Dr. Moore made two observations that reflect upon the quality of the educational environment at MSUM:

- 1) Summarizing student comments and evaluations of the department, Dr. Moore stated, "*This level of satisfaction of undergraduates with their department is rare, and is undoubtedly due to the commitment of the faculty to their students.* Although every department at every university claims that it is committed to its students, many aren't. *It was very refreshing to see the commitment of the faculty in the biology department to their students.*"
- 2) "The biology department offers many opportunities for students to do independent research. *This is a major strength of the department, for it provides unique opportunities that are often unavailable at comparable departments.*"

Biology professor, Dr. Brian Wisenden, is an internationally renowned behavioral biologist. He is regularly invited to present his research with MSUM undergraduates at international meetings.

Two examples:

- XI European Congress of Ichthyology, Tallinn, Estonia
- Towards a behavioral genetics of zebrafish (NIH). Wood's Hole Marine Biological Station, MA

Dr. Wisenden is also an Associate Editor for the Journal Behaviour. He reviews an average of 2 - 4 articles per week for this and other journals.

Undergraduate Research

Faculty members throughout the Biology Department share a commitment to undergraduate research. Although, the Biology Department at MSUM has enjoyed a strong academic reputation, it was only from 1995 onward that the Biology Department became committed to transforming itself from a purely teaching department to one that values research as an essential component to an undergraduate education in biology. Since then, each new faculty member hired has contributed momentum for this goal and by 1998, faculty student research had expanded to such a level where we now consider ourselves *the* regional leaders of student centered research activity. Here are our numbers that substantiate this claim.

Since 1995 to the present, the Biology faculty have mentored 407 students in research, resulting in 419 conference presentations, 234 published abstracts, 32 peer reviewed journal papers, 7 scholarly review papers, and 5 book chapters. We believe this is exceptional research productivity from a purely undergraduate institution.

Biology Faculty/Research Specialty/Years at MSUM/ Students Mentored

- Ellen Brisch - Cell Division - 6 years - 35 students
- Chris Chastain - Plant Physiology - 10 years - 73 students
- Linda Fuselier - Population Genetics - 1 year - 3 students
- Michelle Malott - DNA Replication and Molecular Ecology - 4 years - 27 students
- Richard Pemble - Prairie Ecology - 36 years - 3 Generations of MSUM Biology Students
- Joseph Provost - Signal Transduction of Cancer - 8 years - 64 students
- Donna Stockrahm - Wildlife Ecology - 16 years - 88 students
- Alison Wallace - Plant Ecology and Science Education - 5 years - 23 students
- Mark Wallert - Cell Physiology of Cancer - 15 years - 93 students
- Kathryn Wise - Education Technology - 23 years - 39 students
- Brian Wisenden - Behavioral Ecology - 7 years - 51 students.

The Biology/Chemistry Double Major: Biochemistry and Biotechnology Emphasis

The recent publication of the National Research Council's report, *BIO 2010: Transforming Undergraduate Education for Future Research Biologists* succinctly frames the history and direction of reform to undergraduate curricula needed to educate the next generation of biological scientists. The executive summary for this report opens with the following statements:

“How biologists design, perform, and analyze experiments is changing swiftly. Biological concepts and models are becoming more quantitative, and biological research has become critically dependent on concepts and methods drawn from other scientific disciplines... In contrast to biological research, undergraduate biology education has changed relatively little during the past two decades. The ways in which most future research biologists are educated are geared to the biology of the past, rather than to the biology of the present and future. Like research in the life sciences, undergraduate education must be transformed to prepare students effectively for the biology that lies ahead...”

Dr. Ellen Brisch collaborates annually in a summer research project in the laboratory of Dr. Margaret Titus in the Department of Molecular and Cellular Biology at the University of Minnesota. This summer MSUM junior Lisa Magstadt will be joining the project.

Building a Program at the Forefront of National Reform

The BIO 2010 Report concludes with eight recommendations for change in undergraduate biology education.

- 1) *Each institution of higher education should reexamine its current courses and teaching approaches to see if they meet the needs of today's undergraduate biology students.*
- 2) *Concepts, examples, and techniques from mathematics, and the physical and information sciences should be included in biology courses.*
- 3) *Successful interdisciplinary teaching will require new materials and approaches.*
- 4) *Laboratory courses should be as interdisciplinary as possible.*
- 5) *All students should be encouraged to pursue independent research as early as is practical in their education.*
- 6) *Seminar-type courses that highlight cutting-edge developments in biology should be provided on a continual and regular basis throughout the four-year undergraduate education of students.*
- 7) *Medical school admissions requirements and the Medical College Admissions Test (MCAT) are hindering change in the undergraduate biology curriculum.*
- 8) *Faculty development is a crucial component to improving undergraduate biology education.*

Dr. Michelle Malott participated in the NSF-funded, Dartmouth ELSI (Ethical, Legal, and Social Implications of the Human Genome) Course in 2004.

Dr. Ellen Brisch participated in the AQLM (Analytical and Quantitative Light Microscopy) Course at Marine Biological Laboratory at Woods Hole, MA in 2004.

Drs. Shawn Dunkirk, Joe Provost and Mark Wallert are members of Project Kaleidoscope Faculty for the 21st Century.

Seven of the Bio2010 recommendations are directed toward educational institutions. In the MSUM Biology Department, five of them had been implemented prior to the report being published. The other two are currently being implanted.

In April 2003, Dr. William H. Heidcamp, Professor of Biology at Gustavus Adolphus College, and President of the North Central District 3 for Beta Beta Beta, the National Biological Honors Society visited MSUM to review the Biochemistry and Biotechnology (B&B) Emphasis. In his summary report Dr. Heidcamp concluded that:

“There is an excitement within the Biology Department’s B&B Emphasis that is contagious. The faculty have it, the students demonstrate it, and visitors quickly pick up on it. The goal of creating an atmosphere of scientific inquiry based on research has clearly been met. The program is going remarkably well and could easily serve as a national model for how to structure an undergraduate program around inquiry and on research as a tool for education.”

The Annual Biology Research Banquet

Each April, all Biology research students are required to present their research at the MSUM Academic Conference. That night, the Biology faculty hosts the Biology Research Banquet to acknowledge all of the successful research students and roast our seniors. The MSUM President, Vice-President of Academic Affairs, and the Dean of Social and Natural Sciences regularly attend the Banquet.

Curriculum Development in the Biochemistry and Biotechnology Emphasis

To our knowledge, the design of the MSUM B&B curriculum is among the first programs nationally to incorporate the investigative laboratory teaching approach in a planned, coordinated fashion in all four years of the biology and chemistry baccalaureate. Evidence of our concept as a sound and viable direction for the future is from the funding gained by several faculty members involved in the B&B Emphasis.

Drs. Joe Provost and Mark Wallert are members of the Education and Professional Development Committee of the American Society of Biochemistry and Molecular Biology.

In this capacity, they:

- Are organizing the undergraduate poster competition for the 2005 National Meeting.
- Are organizing a Plenary Session for the 2006 National Meeting.
- Have been invited to present at the International Meeting in Kyoto, Japan in 2006.

Drs. Joe Provost and Mark Wallert have served as consultants to the North Dakota Biomedical Research Infrastructure Network funded by the National Institutes of Health for the past three years.

In this capacity, they have presented 3 Workshops and 2 Invited Presentations training faculty members from the North Dakota Four-Year and Tribal Colleges how to build undergraduate programs around research-based, investigative learning.

Funding the Biochemistry & Biotechnology Emphasis

Since 1997, faculty in this program have been the recipient of nearly \$1,300,000 in funding. This includes investments in over \$500,000 worth of laboratory equipment. This equipment is extensively used in freshman through senior biology and chemistry laboratories. This equipment would not have been available to MSUM students without the initiative of the B&B faculty and without the success of our students.

Grant Type	NSF Funds / MSUM Match	Dates	Title / Authors
ILI	\$32,010	8/15/97	Biotechnology Training Enhancement at Moorhead State University.
	\$118,000	7/31/99	Mark A. Wallert, Shawn G. Dunkirk, Chris J. Chastain
CCLI	\$77,059	4/15/01	The Biotechnology Emphasis: Integrating Research into Education to Build a Learning Community
	\$77,059	3/31/04	Mark A. Wallert, Chris J. Chastain, Ellen Brisch, Joseph J. Provost, Shawn G. Dunkirk
MRI	\$116,163	9/01/01	Optical Imaging and Fluorescence Microscopy Enhancement
	\$ 36,957	8/31/04	Ellen Brisch, Chris J. Chastain, Joseph J. Provost, Mark A. Wallert
CCLI	\$95,496	8/15/04	Incorporating Research-based Investigative Experiences into Freshman Level Cell Biology
	\$44,312	8/1/06	Mark A. Wallert

Currently, over 600 students per year enroll in classes that utilize this equipment.

Collaborations with Biochemistry & Biotechnology Emphasis

The MSUM Biology, Physics and Math Departments recently submitted a \$1,450,000 National Science Foundation STEM Enhancement Program grant to increase the number of graduates in these departments. Biochemistry and Biotechnology faculty members have recently been invited to participate in a \$2,000,000 comprehensive teaching and research grant.

Drs. Ellen Brisch and Michelle Malott were Keynote Speakers at the 2004 Minnesota State University Mankato Undergraduate Research Conference. Talk entitled "Creating an Active Learning and Instructional Block in Advanced Optical Imaging Techniques."

All Biology Faculty Members Contribute to Student Biochemistry and Biotechnology Projects.

Dr. Wisenden is a regular collaborator developing molecular ecology based biochemistry and biotechnology research projects.

All of the Ecology and Field Biology Faculty, Drs. Fuselier, Stockrahm, Pemble, Wisenden, and Wallace have committed to the incorporation of molecular techniques into their curriculum.

Barry M. Goldwater Scholarships

In the past four years the Biology Department at MSU Moorhead has had five Barry M. Goldwater Scholars. The Goldwater Scholarship is the top national scholarship in science, engineering, and mathematics. Each year approximately 300 scholarships are awarded nationally.

<p><u>Rachel Sang</u></p> <ul style="list-style-type: none"> • 2004-05, 2005-06 Academic Years • Biochemistry and Biotechnology Emphasis • Steven, Minnesota 	<p><u>Nicole Korpi</u></p> <ul style="list-style-type: none"> • 2001-02 Academic Year • Biochemistry and Biotechnology Emphasis • Faribault, Minnesota • Ph.D. Candidate University of Wisconsin – Madison, Biomolecular Chemistry
<p><u>Heidi Jo Johnson</u></p> <ul style="list-style-type: none"> • 2003-04 Academic Year • Biochemistry and Biotechnology Emphasis • New Town, North Dakota • Ph.D. Candidate, Eppley Cancer Center, University of Nebraska Omaha 	<p><u>Daniel McEwin</u></p> <ul style="list-style-type: none"> • 2001-02 Academic Year • Biology Major • Moorhead, Minnesota • Ph.D. Candidate North Dakota State University, Aquatic Ecology
<p><u>Hillary Thronson</u></p> <ul style="list-style-type: none"> • 2002-03 Academic Year • Biochemistry and Biotechnology Emphasis • Watertown, South Dakota • M.D. / Ph.D. Candidate University of South Dakota School of Medicine 	<p><u>Lisa Stritz</u></p> <ul style="list-style-type: none"> • 2004-05 Nominee • Biochemistry and Biotechnology Emphasis • Bismarck, North Dakota • Plans to pursue M.D. / Ph.D.

Success Stories – Graduate/Professional Schools

<p><u>Jessica Heck - Senior</u></p> <ul style="list-style-type: none"> • Moorhead, Minnesota • Accepted University of Wisconsin – Madison, Molecular and Cellular Pharmacology 	<p><u>Dylan Voge - Senior</u></p> <ul style="list-style-type: none"> • Wadena, Minnesota • Accepted University of Minnesota Duluth School of Medicine – Early Decision Program
<p><u>Justin Voog - 2003 Graduate</u></p> <ul style="list-style-type: none"> • Belgrade, Minnesota • M.D. / Ph.D. at the University of California – San Diego • Medical Scientist Training Program Scholarship recipient. 300 MSTP Scholarships are given annually by the National Institutes of Health. • Value approximately \$350,000 	<p><u>James Denker - 2003 Graduate</u></p> <ul style="list-style-type: none"> • Battle Lake, Minnesota • Ph.D. Candidate, University of Iowa, Interdisciplinary Biochemistry Cell Biology Program
<p><u>Mario Fernandez- 2003 Graduate</u></p> <ul style="list-style-type: none"> • Moorhead, Minnesota • Started at MSUM in the Post-Secondary Education Option program • Ph.D. Program, Eppley Cancer Center, University of Nebraska Omaha 	<p><u>Isaac Manke - 2000 Graduate</u></p> <ul style="list-style-type: none"> • Woodbury, Minnesota • Will complete Ph.D. from MIT in May 2005 • First professional publication was in the Journal Science. The number one scientific journal in the world.
<p><u>Jason Brown – 2003 Graduate</u></p> <ul style="list-style-type: none"> • Aberdeen, South Dakota • Ph.D. Candidate East Carolina University, Interdisciplinary Biological Science 	<p><u>Anojni Nagahawatta – 2003 Graduate</u></p> <ul style="list-style-type: none"> • Sri Lanka • Ph.D. Candidate in the Molecular and Cellular Biology Program at the University of Minnesota

Success Stories – Employment

<u>Kris Mortenson</u> <ul style="list-style-type: none"> • Working for Cargill 	<u>Breann Stoltz</u> <ul style="list-style-type: none"> • Working for Cargill
<u>Julie Vogel</u> <ul style="list-style-type: none"> • Working for R&D Systems 	<u>Christa Randklev</u> <ul style="list-style-type: none"> • Working for R&D Systems
<u>Matt Baumgartner</u> <ul style="list-style-type: none"> • Working for R&D Systems 	<u>Justin Klitzke</u> <ul style="list-style-type: none"> • Working for Cargill
<u>Jeff Clausen</u> <ul style="list-style-type: none"> • Kodak Bioresearch 	<u>Grant Harrington</u> <ul style="list-style-type: none"> • USDA Laboratory, Fargo N.D.
<u>Judi Loy</u> <ul style="list-style-type: none"> • Working for PRACS 	<u>Autumn Dinnel</u> <ul style="list-style-type: none"> • Working for PRACS
<u>Sara Larson</u> <ul style="list-style-type: none"> • Working for R&D Systems 	<u>Bree Hamann</u> <ul style="list-style-type: none"> • United States Embassy in Japan • Teaches High School Science

**The MSUM Biochemistry and Biotechnology Emphasis
has an excellent placement rate for graduates.**

Science Outreach

One of our major efforts is to serve as a regional science educational resource for area K-12 teachers and students. The college has an outreach coordinator and started a variety of programs for teachers and students alike. These programs include:

1) **World of Change Workshop.** This workshop is a one-day event for middle and high school teachers to provide them with information on new and better ways to teach science and math with hands-on and research-based activities. In the past five years nearly 350 teachers have participated in these workshops.

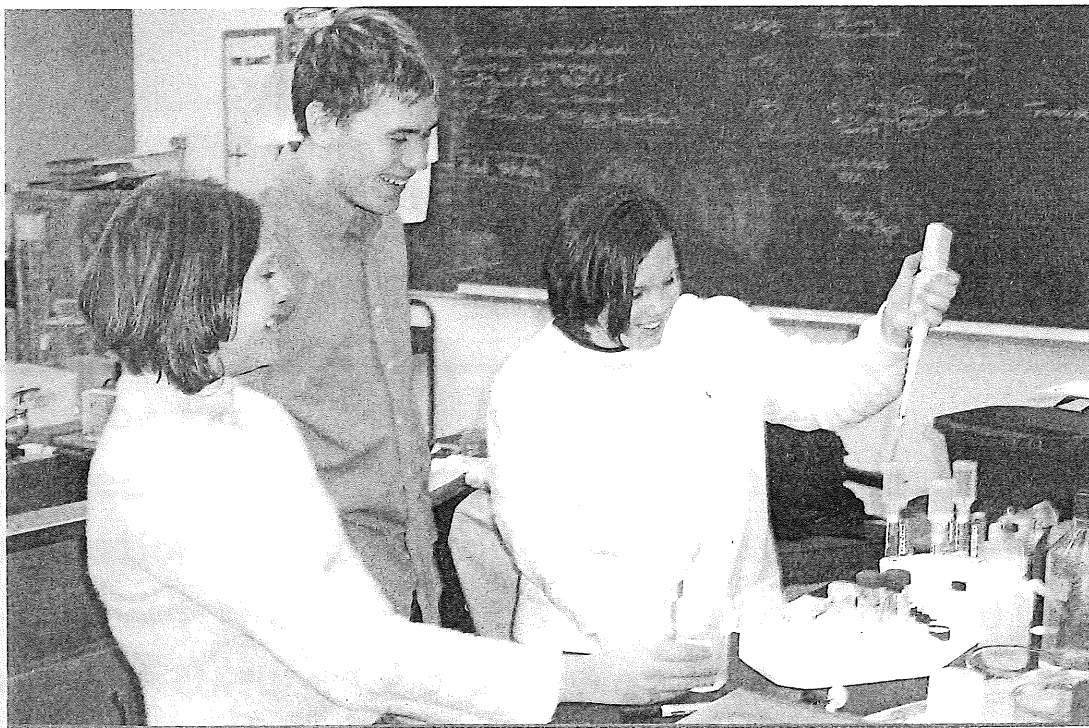
2) **Science and Math Day.** This is a one-day event where area high school teachers bring their students to the MSUM campus to participate in laboratory activities that they could not do in their respective schools. Each visiting student participates in two 3-hour laboratory blocks of their choosing. In the past three years nearly 300 high school students have participated in this event.

3) **Classroom Visits.** This program involves MSUM faculty members visiting K-12 classrooms and bringing all the materials and supplies to do activities and provide laboratory experiences that are typically beyond the scope or the expertise of the teachers.

In the past five years, College of Social and Natural Science faculty members from MSUM have visited the classes of over 8,000 K-12 students to promote science and Math.

College of Social and Natural Science Outreach Statistics

	99 - 00	00 - 01	01 - 02	02 - 03	03 - 04
World of Change Participants High School Teachers	60	65	81	63	75
Science and Math Day High School Students Teachers		93 6	90 6	97 7	Not Available
School Visits Student Contacts Teacher Contacts Other Contacts (Parents and Members of Public)	1846 104 126	1974 156 249	2103 197 387	2227 217 842	Not Available



High School Research Mentor Program

Over the past five-years MSUM faculty members mentored over 20 students from area high schools. These students conduct research projects in order to compete at the regional, state, and national science fairs. An example of one of our collaborations occurs between Drs. Chris Chastain, Ellen Brisch, Joe Provost, and Mark Wallert and the students of Perham, MN high school and their science teacher Beth Schwarz. Under the mentorship of Drs. Provost and Wallert, the Perham High students participate in cancer research, performing part of their work at their school and part at the MSUM campus.

During the 2003-2004 academic-year seven Perham students worked with Drs. Brisch, Chastain, Provost and Wallert. All of these students qualified to compete at the state science fair after entering their research at the Northwest Regional Science Fair. Three of these students won their state competition and advanced to the Intel International Science Fair. Finally, two of these students competing as a team finished in the top 15% in this prestigious science fair.

During the 2004-05 academic year two additional Perham students are working in the Provost and Wallert laboratory. Kassia Pawlowski and Dani Rastedt will each be presenting at the Northwest Regional Science Fair on February 28, 2005. Following graduation, both plan to attend MSUM and pursue an Emphasis in Biochemistry and Biotechnology

Drs. Joe Provost and Mark Wallert have received funding from the National Science Foundation and a Roland Dille Excellence Award to support these projects, including funds to set up a cell culture laboratory at Perham High School.

MSUM Regional Science Center

The Regional Science Center is located 15 miles from the MSUM campus along the beach ridges of glacial Lake Agassiz. The site includes 300 acres of native prairie and riparian woodlands along the Buffalo River. The RSC's tallgrass prairie site is adjacent to two larger natural reserves, the Buffalo River State Park (1,200 acres) and the Nature Conservancy's Bluestem Prairie and Scientific Area (3,500 acres). This 5,000-acre tallgrass prairie is the largest managed original tallgrass prairie in Minnesota. The site includes a 13,000 square foot Interpretive Center built in 1992.

Since 1984 the mission of the RSC is to provide programs in natural history and observational astronomy to area K-12 students, college students, area K-12 teachers and the general public.

Each year over 16,000 K-12 students from 125 schools participate in Regional Science Center Programs.

Our 4,000 college students from three area colleges and universities use the site for biology field studies as well as telescope viewing in the Feder Observatory. Currently a director, a naturalist, an astronomy coordinator and an office manager staff the Center. Student employees, seasonal employees and over 130 volunteers assist these full-time staff.

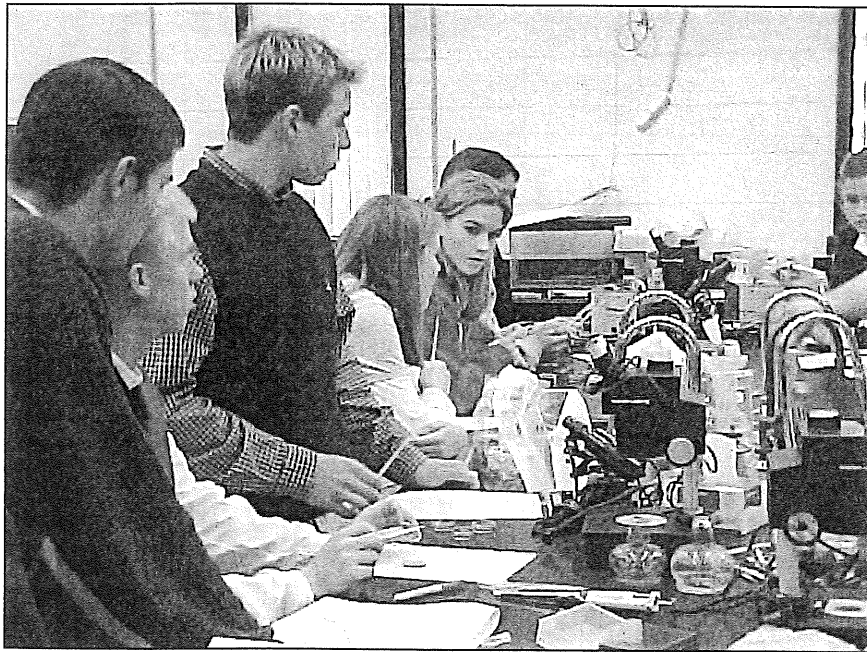
Training Science Teachers

The Biology Department has a long history of outreach to in-service and pre-service science teachers.

Two current examples are:

Drs. Ellen Brisch and Michelle Malott Science Teachers Workshop: “Putting Science in the Middle: Cellular and Molecular Biology Content and Pedagogy for Grades 5 – 9.”

Drs. Steve Lindaas, Shawn Dunkirk, and Alison Wallace project: “Science in the Middle: Dissemination and Kit Development, Grade 5-9 Basic Biology.”



A select list of the grants received by the Biology faculty

External BBE Grants Page 1

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
2002	Ellen Brisch, Mark Wallert, Chris Chastain, Michelle Malott Joe Provost, and Barb Hoppe	Tegrity Web Learner Technology Equipment to Enhance Biotechnology Equipment Training.	\$ 30,000.00	MnSCU Leveraged Equipment Grant	Leveraged Equipment Grant Match Grant
2004	Joe Provost and Mark Wallert	Adrenergic Activation of NHE Requires PLD in CCL39 Cells.	\$197,000	NIH	NIH - AREA NIH1-R15-HL074924-01A1
1999		ASBMB Undergraduate Faculty and Student Travel Award; \$800	\$ 800.00	ASBMB	Undergraduate Faculty and Student Travel Award
2004	Mark Wallert	Incorporation of Web Based Teaching Technology to Enhance Freshman Cell Biology Laboratory.	\$15,000	MnSCU	Center for Teaching and Learning
2004	Judy Peterson, Ronald Jeppson, Joe Provost and Mark Wallert.	MSUM Science Culture and Microscopy Facilities	\$30,000	Anheuser-Busch Foundation Grant	Anheuser-Busch Foundation Grant
1998	Mark Wallert and Shawn Dunkirk	Biotechnology for High School Teachers	\$38,964	Eisenhower Professional Development Program	Eisenhower Professional Development Program
1996	Mark Wallert	Investigating Biology for Elementary Teachers	\$29,204	Eisenhower Professional Development Program	Eisenhower Professional Development Program
1994	Mark Wallert	Isolation of Cardiac Ventricular Myocytes from Suckling Pigs.	\$4,185	North Dakota Experimental Project to Stimulate Competitive Research (NDEPSCoR)	North Dakota Experimental Project to Stimulate Competitive Research (NDEPSCoR)
2004	Joe Provost	A Biochemical Analysis of Autism.	\$1,000	TriBeta National Research Award.	
2004	Joe Provost	Student Travel Award	\$900	ASMBM	
2004	Joe Provost	Advancing the Incorporation of Research and Technology Into MSUM Biochemistry and Biotechnology Courses	\$ 15,000.00	MnSCU	Center for Teaching and Learning Grants

External BBE Grants Page 2

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
2004	Mark Wallert and Joe Provost	Regulation of NHE and MAPK Requires PLD.	\$197,500.00	NIH	R15 AREA
2004	Michelle L. Malott and Ellen Brisch	Putting Science in the Middle: Cellular and Molecular Biology Content an Pedagogy for Grades 5-9.	\$ 31,598.00		Minnesota Higher Education Services Office
2003	Joe Provost	Autistic Genetic Exchange, Genetic and cellular materials for autism research. Materials Award.	Materials Award		
2002	Ellen Brisch and Michelle L. Malott	Co-PI on proposal with Dr. Michelle Malott for project entitled: Creating an active-learning instructional block in advanced optical imaging techniques.	\$ 4,985.00	MnSCU	CTL Grant
2002	Mark Wallert and Joe Provost	Involving High School Students in Biomedical Research	\$ 10,000.00	NSF	RUI RET
2002	Mark Wallert and Joe Provost	Creating a concerted biochemistry problem based laboratory	\$ 2,750.00	MnSCU	Center for Learning and Teaching
2001	Ellen Brisch, Mark Wallert, Chris Chastain and Joe Provost	Optical Imaging Fluorescence Microscopy enhancemen	\$ 116,163.00	NSF	Major Research Instrumentation Grant
2001	Joe Provost	Undergraduate Faculty Awards	\$ 1,700.00	American Society of Biochemistry and Molecular Biology	Undergraduate Faculty Award
2001	Mark Wallert, Joe Provost, Chris Chastain, Shawn Dunkirk	Moorhead State University Biotechnology Emphasis: Integrating	\$ 154,790.00	NSF	CCLI
2000	Joe Provost	Aldevron LLC Purification of adjuvant for oral vaccines	\$2,000	Aldevron LLC	LLC
2000	Joe Provost and Mark Wallert	Regulation of MAP Kinase and NHE1 by the G proteins Gq and G13	\$156,341	NSF	RUI Grant
1999	Ellen Brisch (PI)	Molecules required for mitochondrial morphology second year of funding awarded	\$ 25,000.00	Primary Children's Medical Center	Research Development Award

External BBE Grants Page 3

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
1999	Joe Provost	ASBMB Undergraduate Faculty and Student Travel Award	\$ 800.00	ASBMB	Undergraduate Faculty and Student Travel Award
1998	Ellen Brisch (PI)	Molecules required for mitochondrial morphology	\$ 25,000.00	Primary Children's Medical Center	Research Development Award
1993	Mark Wallert	pH Regulation Cardiac Ventricular Muscle Cells.	\$42,468 Match \$15,000	MN-Heart Association	MN-Heart Association

Internal BBE Grants Page 1

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
2004	Joe Provost	A Biochemical Analysis of Potential Mutations Associated with Autism Syndrome Disorders	\$ 1,730.00	MSUM	Faculty Grant
2004	Mark Wallert	The role of Urokinase Type Plasminogen Activator in the stimulation of ERK, RhoA and NHE in lung cells..	\$ 1,860.00	MSUM	Minnesota State University Faculty Research Grant
2003	Dr. Joseph Provost and Dr. Mark Wallert	A Collaborative MSUM – Perham High School Cancer Research Program,.	\$ 3,183.00	MSUM	Dille Fund for Excellence Award
2003	Ellen Brisch	PI on proposal entitled: Students Understanding Cancer: Basic research on cell division control mechanisms that regulate microtubule assembly.	\$ 1,641.00	MSUM	Faculty Grant
2003	Ellen Brisch	Professional Development Award for proposal entitled: Bringing the Worm to MSUM.	\$ 850.00	MSUM	Faculty Grant
2003	Ellen Brisch	Professional Development Award for proposal entitled: Bringing the Worm to MSUM.	\$ 1,036.00	MSUM	Faculty Grant
2003	Joe Provost	Role of phospholipase D in MAPK activation.	\$2,500.00	MSUM	Faculty Grant
2002	Ellen Brisch	Regulation of mitochondria through cell division: Blending classic approaches with novel molecular tools.	\$ 3,111.00	MSUM	Faculty Grant
2002	Michelle L. Malott	Measuring DNA Damage and Apoptosis in Cells Exposed to Ultra-Violet Radiation.	\$ 988.80		Dille Fund for Excellence
2002	Michelle L. Malott	Biochemical Regulation of Cell Division in Cancer Cells.	\$ 2,315.00		Faculty Research Grant
2001	Ellen Brisch	Regulation of microtubule assembly by MAPK activity	\$ 2,000.00	MSUM	Dille Excellence Award
2001	Ellen Brisch	Coordination of organelle dynamics during cell division.	\$ 2,000.00	MSUM	Faculty Grant

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
2000	Joseph Provost and Mark Wallert.	Hormonal Regulation of Intracellular pH via G Protein Signaling Molecules in Lung Cells	\$ 2,164.00	MSUM	Dille Fund for Excellence Award.
2000	Mark Wallert	Regulation of NHE1 in neonatal heart cells by Phenylephrine and ATP through RhoA and MAP Kinase. .	\$ 2,325.00	MSUM	Moorhead State University Faculty Research Grant.
2000	oe Provost and Mark Wallert	Lysophosphatidic acid Transactivation of the Epidermal Growth Factor Receptor - Implications for the Regulation of Cellular signilaing in Lung cells	\$ 2,200.00	MSUM	Faculty Grant -
1999	Joe Provost	Acquisition of a Centrifuge	\$ 27,000.00	MSUM	Strategic Goals Initiative -
1999	Mark Wallert	Optimizing Transfection of Neonatal Cardiac Myocytes in Culture.	\$ 2,225.00	MSUM	Moorhead State University Faculty Research Grant
1998	Mark Wallert	Using Oligodeoxynucleotides to Alter Na-H Antiporter Activity in Cultured Neonatal Heart Cells. .	\$1,700	MSUM	Moorhead State University Faculty Research Grant.
1997	Mark Wallert, Chris Chastain and Shawn Dunkirk	Development of an Interdisciplinary Concentration in Biotechnology. Drs.	\$118,000	MSUM	Strategic Goals Initiative Award
1995	Mark Wallert	pH Regulation in Neonatal Ventricular Muscle Cells from Rats	\$2,080	MSUM	Moorhead State University Faculty Research Grant
1991	Mark Wallert	Homeostatic Mechanisms in <u>Dictyostelium discoideum</u> .	\$2,000	MSUM	Moorhead State University Faculty Research Grant
1990	Mark Wallert	Chloride Transport Mechanisms in Isolated Cardiac Myocytes.	\$2,000	MSUM	Moorhead State University Faculty Research Grant
		Regulation of RhoA and MAPK by G proteins -	\$ 2,300.00	MSUM	MSU Faculty Grant
		Regulation of Phospholipase D through a Tyrosine Protein Kinase	\$ 2,000.00	MSUM	MSU Faculty Grant

External RSC Grants Page 1

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
2002	George R. Davis	Teachers Research Network project (a study of the retention of new K-12 math and science teachers in Minnesota) participation grant, SciMathMN	\$16,651	SciMathMN	Teachers Research Network participation grant
2002	George R. Davis and Matt Craig	CO-PI with Dr. Matt Craig, Seeing is Believing, a physical science exhibit develop project	\$ 201,000.00	NSF	
2001	George R. Davis	Teachers Research Network project (a study of the retention of new K-12 math and science teachers in Minnesota) participation grant, SciMathMN	\$ 19,691.00	SciMathMN	Teachers Research Network participation grant
2000	George R. Davis	Teachers Research Network project (a study of the retention of new K-12 math and science teachers in Minnesota) participation grant, SciMathMN	\$ 10,398.00	SciMathMN	Teachers Research Network participation grant
1999	George R. Davis	Co-PI with four other MSUM faculty a Partners in Technology in teaching grant	\$169,000.00	U.S. Department of Education	Partners in Technology in teaching grant
1999	George R. Davis	Teachers Research Network project (a study of the retention of new K-12 math and science teachers in Minnesota) participation grant,	\$14,223	SciMathMN	Teachers Research Network participation grant
1998	George R. Davis	Teachers Research Network project (a study of the retention of new K-12 math and science teachers in Minnesota) participation grant, SciMathMN, \$5,000.	\$ 5,000.00	SciMathMN	Teachers Research Network participation grant
1997	George R. Davis	General operations grant from the Institute of Museum and Library Services for the Regional Science Center.	\$ 60,000.00	Institute of Museum and Library Services	General operations grant

External RSC Grants Page 2

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
1997	George R. Davis	In-kind services from CAMAS-MinnDak 4.5 acre wetland excavation project at Regional Science Center	\$ 20,000.00	CAMAS-MinnDak	
1997	George R. Davis	Grant from the Minnesota Department of Natural Resources for the 4.5 acre wetland excavation project at Regional Science Center	\$ 20,000.00	Minnesota Department of Natural Resources	
1995	George R. Davis	Teaching K-8 Science Outdoors in the Red River Valley	\$6,930.00	North Dakota	Eisenhower Grant
1995	George R. Davis	General operations grant from the for the Regional Science Center	\$ 50,490.00		Institute of Museum and Library Services
1994	George R. Davis	Worked with 9 Minnesota colleges and universities and the Governor's Advisory Committee for Environmental Education to develop a \$500,000 project to improve the preparation of pre-service K-12 teachers in environmental education. MSUM's share of the two year project is \$27,000.	\$ 27,000.00	MN	Governor's Advisory Committee for Environmental Education
1993	George R. Davis	Private donation for a prairie restoration project for Moorhead 3 rd graders	\$ 3,000.00	George Sinner	Private donation
1993	George R. Davis	Teaching Science K-8 outdoors	\$ 13,831.00	North Dakota	Eisenhower Grant
1993	George R. Davis and Patricia Simpson	3. (Co-PI) with Dr. Patricia Simpson at St. Cloud State University a LCMR proposal for environmental education for pre-service K-12 teachers. This proposal was folded in to a combined environmental education LCMR proposal which was funded.	\$99,000	LCMR	

External RSC Grants Page 3

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
1992	George R. Davis	(Co-PI) 1993 Conference on Science Education for Persons with Disabilities	\$ 27,538.00	National Science Foundation:	
1992	George R. Davis	(Co-PI) MN Department of Instruction/Moorhead Schools	\$ 10,000.00	MN	Department of Instruction
1992	George R. Davis	MSUM was a dissemination site for science curriculum workshops for elementary education majors	estimated 5000	National Science Foundation	American Institutes of Research (AIR)
1991	George R. Davis	Red River Study Project	\$ 3,673.00	North Dakota	Eisenhower Grant:
1991	George R. Davis	National Science Foundation/BSCS: ENLIST Micros Center	\$ 22,000.00	NSF	BSCS:
1991	George R. Davis	CHEMS Workshop grant	\$ 3,000.00	Lawrence Hall of Science, Berkeley, CA:	

Internal RSC Grants Page 1

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
1991	George R. Davis	Minnesota Eisenhower Grant: Red River Study Project	\$2,639.00		
1990	George R. Davis	Bush Grant from MSU for Improvement of Instruction	\$ 1,000.00	MSU	Bush Grant for Improvement of Instruction

External ERB Grants Page 1

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
2002	Alison Wallace, George Davis, Donna Stockrahm	Planning for a Tallgrass Prairie Field Station	\$ 14,000.00	NSF	
2001	Brian D. Wisenden	Active Learning outside the classroom: Expansion of undergraduate aquatic research facility	\$ 4,915.00	MnSCU	Center for Teaching and Learning

Internal EFB Grants Page 1

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
2005	Brian Wisenden	Research training in the behavioral ecology of fish	\$ 2,227.00	MSUM	Faculty Research Grant
2004	Brian D. Wisenden	Undergraduate research training in fish ecology and evolution	\$ 2,050.00	MSUM	Faculty Research Grant
2003	Brian D. Wisenden	Evolutionary ecology of Ostariophysan club cells	\$ 2,105.00	MSUM	Faculty Research Grant
2001	Brian D. Wisenden	Expansion of undergraduate aquatic research facility	\$ 2,500.00	MSUM	MSUM Research grant from Dean
2001	Brian D. Wisenden	Chemical ecology of predator-prey interactions in aquatic animals	\$ 500.00	MSUM	Faculty Research Grant
1999	Brian D. Wisenden	A test for a genetic basis for antipredator behavior in fathead minnows	\$ 2,300.00	MSUM	Faculty Research Grant
1999	Brian D. Wisenden	Chemical ecology of predator-prey interactions in aquatic animals	\$ 1,950.00	MSUM	Dille Fund for Excellence
2005	Linda Fuselier	Population genetic structure and evolutionary relationships in the liverwort, <i>Marchantia inflexa</i> , \$2992	\$ 2,992.00	MSUM	Faculty Research Grant
2005	Linda Fuselier	Sex ratios and sexual dimorphism in a migratory dragonfly, the common green darner	\$ 2,000.00	MSUM	Dille Fund for Excellence
2003	Brian Wisenden	Predator-recognition training of naïve hatchery-reared walleye	\$ 248.00	MSUM	MSUM Alumni Foundation
2003	Brian Wisenden, Anusha Mishra and Bre Hamann	The ontogeny of larval antipredator competence and intraspecific brood adoption in convict cichlids Re Anusha Mishra and Bre Hamann	\$ 150.00	MSUM	MSUM Biology Research Scholarship
2002	Brian Wisenden	Undergraduate research in biology	\$ 180.00	MSUM	MSUM Alumni Foundation
2001	Brian Wisenden and Michelle L. Malott	The Evolution of Alternative Reproductive Strategies in Minnows.	\$ 1,190.00	MSUM	Faculty Research Grant
1998	Brian Wisenden	Experiential versus genetic contributions to antipredator behavior in minnows	\$ 400.00	MSUM	MSUM Alumni Foundation Grant

Internal EFB Grants Page 2

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
2002	Alison Wallace, George Davis, Donna Stockrahm	Planning for a Tallgrass Prairie Field Station	\$ 14,000.00	NSF	
2001	Brian D. Wisenden	Active Learning outside the classroom: Expansion of undergraduate aquatic research facility	\$ 4,915.00	MnSCU	Center for Teaching and Learning

External BBE/EFB Grants Page 1

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
2003	Brian D. Wisenden & Michelle Malott	Molecular Ecology: harmonizing emphases in biotechnology and field biology	\$ 4,951.00	MnSCU	Center for Teaching and Learning
2004	Brian D. Wisenden and Michelle L. Malott	Linking Research Training to Curriculum Enhancement in Molecular Ecology.	\$ 14,988.00	MnSCU	Center for Teaching and Learning. Learning that Lasts Grant. MnSCU
2004	Mark Wallert, Ellen Brisch, Michelle Malott, SuEllen Shaw, Patricia Wisenden	Incorporating Research-based Investigative Experiences into Freshman Level Cell Biology	\$ 95,496.00		NSF, CCLI – Adaptation and Implementation

Internal BSE/EFB Grants Page 1

Year	Authors	Title	Amount Requested	Funding Agency	Funding Agency Division
2001	Brian D. Wisenden & Ellen Brisch	Phenotypic engineering and optimal egg size in a biparental fish	\$ 1,300.00	MSUM	Dille Fund for Excellence
2002	Brian Wisenden and Ellen Brisch	Co-PI on proposal with PI Dr. Brian Wisenden for project entitled: Phenotypic engineering and optimal egg size in a biparental fish	\$ 1,300.00	MSUM	Dille Excellence Award
2000	Daniel McEwen (student) and Michelle L. Malott	Inbreeding Depression in a Colony of Black-Tailed Prairie Dogs At Theodore Roosevelt State Park.	\$ 1,500.00		Dille Fund for Excellence

