

Project Summary

Missouri Western State College (MWSC) offers a strong program in experimental psychology and related courses. Over the past decade, MWSC psychology students have made more presentations, and earned more awards, in the Missouri Academy of Science undergraduate paper competitions than students from any other college in the state, regardless of discipline. In recent years, the focus of the program has started to shift to more computer assisted instruction. All psychology majors now receive training in the use of electronic mail, word processors, spreadsheets, web-browsers (e.g. Netscape), and basic statistical analysis software. In addition, students have been placing their independent projects on the college's WWW server for the past two years. Although the college has limited computer resources available for both in-class and independent use, those resources are heavily taxed and are shared with all other departments on campus. Moreover, the computer laboratories that are available do not have the required software or technical support for conducting statistical analysis or for data collection.

The objective of the current project is to develop a comprehensive computerized laboratory that will allow students to integrate better the computer skills they learn into their current academic work, their future professional work, and their future scientific endeavors. This will allow an increase in both the amount and quality of research that is produced by our undergraduate students. The skills acquired in this laboratory should give students the technical knowledge required for critical thinking in modern society. A further goal is to increase the communication among undergraduate researchers through the use of modern technology.

The project will create a 17 station teaching/research laboratory where students can learn and practice all steps of the scientific research process. This will be accomplished through four components: (1) Basic Research Skills (2) Statistical Analysis (3) Data Collection and (4) Simulation and Demonstration. These four components should enhance MWSC psychology students' already exceptional record of independent research, and promote enthusiasm for careers in science.

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Results from Prior NSF Support

Neither the principal investigator nor the co-principal investigator have received support from NSF pertaining to undergraduate education in the past 5 years.

Narrative**(A) Current Situation**

1. College and Psychology Department. Missouri Western State College is an open admissions, public state college of 5200 undergraduates. Of 114 faculty in the Division of Liberal Arts and Sciences, to which the Department of Psychology belongs, 75 have an earned doctorate. There are seven full-time psychology faculty, six of whom hold the Ph.D., with specialty areas in cognitive, clinical, physiological, counseling, industrial/organizational, developmental, and general experimental psychology.

Psychology is one of the most popular majors on campus, with more students seeking to enroll in the program than the department can handle. Currently, students who desire to major in psychology apply after completing introductory and intermediate psychology, and the general studies math and English requirements. Admission is on a competitive basis.

Although Missouri Western is primarily a teaching institution, most psychology faculty are engaged in research, especially collaborative research with students. Each year a high percentage of psychology students conduct studies which are presented at regional psychology conferences (e.g., Great Plains Students' Psychology Convention, the Missouri Academy of Science, and Midwestern Psychological Association). Over the past decade, Missouri Western psychology students have made more presentations, and earned more awards, in the Missouri Academy of Science undergraduate competitions than students from any other college in the state, regardless of discipline.

2. The Curriculum. More than 1000 students take the introductory course each year, and approximately 150-200 of those also enroll in the follow-up intermediate psychology course. For students admitted into the major, a core curriculum of courses in statistics, research methods, and experimental psychology laboratory provides a foundation in the scientific analysis of behavior and cognitive processes. Students must also take at least two classes in each of our natural science and social science core psychology courses (See Appendix I.b). At the junior and senior level, students have the opportunity for independent research or practicum courses. Honors students are

required to complete a two-semester independent research project in their senior year. Advanced students also have the opportunity to collaborate with a faculty member on projects in the Undergraduate Research Summer Institute supported by the MWSC Foundation and the college's Division of Liberal Arts and Sciences.

3. Experimental Psychology Laboratory Course (32 students/year). The course most directly affected by this ILI project will be the laboratory class in experimental psychology. (A complete summary of anticipated changes in curriculum is presented in Appendix II.) This course gives students hands-on research experience, as well as training in writing empirical research reports, and training in the use of computers in each stage of the research process. The course culminates with an independent research project. That project is presented to the college community during a poster session, and is posted on the college's World-Wide-Web server. The best projects are often presented later at undergraduate research conferences.

4. Statistics/Intermediate Statistics (40 students/year). The two statistics courses in our curriculum are both computer intensive, and will benefit greatly from the ILI project. The introductory statistics course includes a short section on statistical packages. In that introductory statistics course, students create a psychological scale and assess it for reliability and validity. In the intermediate statistics course, students expand their knowledge of statistical procedures. The entire course is taught using the SPSS software package on the college mainframe. In this course, the emphasis is on the practical uses of statistics (and research design) in educational, business, and traditional academic research.

5. Limitations of Current Resources. The department does not currently have a computerized research laboratory. A small number of "hand-me-down" computers are available (2-286 and 3-386) for student use. These machines are not capable of running the Windows based statistical and data collection software that we would like to use. They are primarily used for Internet access and basic word processing. Even with their limitations, these computers are highly utilized. Most of the day all of the machines are being used, and only very rarely is the lab not in use.

Students/courses have access to the college's general use computer laboratories. These general use labs are very highly used (there are approximately 250 machines in 10 labs serving 5200 students). Often there are long waits for students to gain access to these machines. Most of these machines are also rather dated, with only two Windows labs having both CD-ROM and sound. Some of the other labs do not have Windows based software at all.

The general purpose labs do not support discipline specific hardware/software. They are primarily used to teach basic word processing, graphics, and Internet access. SPSS (base module only) is installed on a small percentage of machines, and those machines are shared by the Business and Nursing departments. The only license for the professional and advanced modules of SPSS is for the college mainframe. Without these additional modules, students are unable to conduct reliability analyses or repeated measures ANOVA. There is no technical support available in the general purpose labs for students to receive help on psychology specific topics, such as APA style, statistics, or data collection software. The general purpose labs are not usable for running simulation or data collection software because of their "walk-in" nature. When students require assistance, they must give up their seat in the lab, seek out assistance in the department, and return to the lab and hope that a machine becomes available again quickly.

Because of the general purpose nature of the existing labs, the configurations of equipment are not always consistent. SPSS (when running under Windows 3.1) has stringent memory and configuration requirements, and thus cannot be run on many of the machines in a lab. This creates problems during class (where the instructor spends a good part of the class configuring machines) and for students attempting to complete outside assignments. The development of a Psychology Department computer laboratory would allow students to be taught in the same room that they have available for their assignments. In addition, technical support on department specific hardware/software would be immediately available from the faculty. Finally, a laboratory would be available where students could use computers to collect data for their independent laboratory projects.

Currently, our students are severely limited in the types of studies they can conduct because of the absence of a modern psychology laboratory. In particular, cognitive psychology has been greatly assisted by advances in computer technology which allows subtle investigations of cognitive processes. Our students do not receive training in these current methods of data collection and analysis because of the lack of modern laboratory equipment.

(B) Development Plan.

1. Goals.

“The goal – indeed, the imperative – deriving from our review is that: All students have access to supportive, excellent undergraduate education on science, mathematics, engineering, and technology, and all students learn these subjects by direct experience with the methods and process of inquiry.”

Shaping the Future – Advisory Committee
to the National Science Foundation (NSF 96-139)

The primary goal of this project is to enhance instruction in laboratory courses and to provide our students with practical experience with modern research tools and methods. This will be accomplished by integrating a four component program into several of our courses, especially research methods laboratory, statistics, and intermediate statistics. These components are the use of computers for (1) Basic Research Skills (2) Statistical Analysis (3) Data Collection and (4) Simulation and Demonstration. Access to a departmental computer laboratory will also provide the opportunity to provide a laboratory component to some of our non-laboratory courses (e.g. Sensation & Perception, Physiological Psychology, Cognitive Psychology, etc.), as well as interactive research based components to our lower-division courses (see Appendix II).

A secondary goal of this project is to establish an Undergraduate Psychology Research Clearinghouse using the World-Wide-Web. This clearinghouse will enhance communication among student researchers around the country, and can provide an outlet for high quality student research conducted in all 50 states.

2. The Research Methods Laboratory Course as an Example. The Experimental Psychology Laboratory course currently incorporates a variety of computer skills into its curriculum. Students are taught to use electronic mail for scientific communication (to each other and to researchers

around the world), the use of the Internet and the World-Wide-Web for locating resources, the use of computers for APA style, creating figures and tables, and for basic data collection. Recent literature suggests that these skills are increasingly necessary for advanced education and employment in scientific disciplines (Azar, 1994; Barrie & Presti, 1996; Kelley-Milburn & Milburn, 1995).

The proposed lab will enable this course to meet all four components of the primary goal. The *Basic Research Skills* component will focus on the use of the computer for technical writing, the presentation of results, and for conducting electronic literature searches. We are able to teach the skills in the first component with our existing resources, and we believe that we have been successful given our students' record of research accomplishments. The new equipment should make this process more efficient and less time consuming. This will allow additional time to expand the other components of the proposal. Perhaps the greatest addition in this component will be the increased use of the Internet for collaborating *during* the research process and the enhanced audience for the final product through the use of the Web for presenting final papers. Students currently post their final projects on the Web server, however, the enhanced capabilities of the server requested in this study will also allow MWSC to serve as a national resource (See Undergraduate Research Clearinghouse section below).

The second component, *Statistical Analysis*, will greatly improve the Research Methods Laboratory course. The mainframe version of SPSS is quite cumbersome, so we have not introduced it until our senior level Intermediate Statistics Course. Traditionally, we have used simple programs such as MYSTAT or the base module of SPSS for Windows to analyze the group and individual projects conducted in the lab course. These software packages severely limit the types of analyses that can be conducted (e.g. no repeated measures ANOVA is available) and therefore limit the available lab projects. The introduction of SPSS for Windows (with Professional and Advanced Modules) as the primary data analysis tool will provide students with a wider variety of analysis options, and will give them experience with the most widely used software package.

The third component, *Data Collection*, will also be a major enhancement of the curriculum. Currently, the use of computers for data collection is only briefly discussed. Optical-scan sheets (e.g. Scan-Tron) are used for one of the group projects. Unfortunately, there is not sufficient equipment available for more sophisticated automatic data collection. The proposed project includes funds for the B/C Power Laboratory software package, four machines with a physiological response interface, four video-conferencing enabled workstations, and a system for automated processing of surveys (see equipment section on page 8). This equipment and software will allow students to conduct experiments using masking, matching, visual search, memory span, reaction time, and other paradigms. It will also allow investigations on the impact of communications technology on social interaction and cognitive processes, as well as studies on the effects of technology on the learning of research skills. Students will be able to replicate classic psychological experiments, as well as extend these paradigms to their own independent research projects. (See Appendix III for a list of planned studies and activities.)

The final component, *Simulation and Demonstration*, will also add to the curriculum and allow innovative teaching methods to be investigated. The *Sniffy* software package, which simulates the operant conditioning of a rat, is being requested. Traditionally, the lab class has included a five week section in which students condition a live rat. Inadequate facilities for maintaining and housing live animals caused this unit to be discontinued. The introduction of this simulation will allow students to continue learning about single subject designs and operant conditioning. Dr. Cronk served as a reviewer for the *Sniffy* package, and believes it to be of sufficient quality to simulate adequately the operant conditioning of a live animal.

3. Effects on other courses. While other courses will not be impacted by *all 4 components* like the experimental psychology laboratory course will, many will be impacted by one or more of the components. The Intermediate Statistics course will require less time for the mechanics of operating SPSS on the mainframe, and instead focus more on deciding which tests are appropriate for a given set of data and the interpretation of results. Students in the Introductory Statistics and Measurement course will be able to assess the reliability and validity of the scales they create more

efficiently. Students will also learn the basics of SPSS for Windows at an earlier level, allowing the instructors of more advanced courses to spend less time on mechanics and more time on content.

The simulation and demonstration component will have a large impact on both upper and lower division courses. Many courses (see Appendix II) now have CD-ROM's available that teach students advanced topics in physiological psychology and sensation/perception. CD-ROM's are also available for many General Psychology texts, and provide students with additional interactive experiences.

There are currently no plans to increase the enrollment of the classes affected by the proposal. The increased flexibility provided by an on-site lab, however, may provide for additional sections of the affected courses if faculty resources were available. In total, approximately 6000 credit hours per year will be affected to some degree by this grant.

4. Undergraduate Research Clearinghouse. For the past two years MWSC Psychology students have been posting their projects on the World-Wide-Web. This provides a wide audience for their projects, and allows them to compare their efforts with previous semesters. A departmental server would allow the expanded use of the WebBoard electronic conference center software package. This WWW based package allows students to post messages in various "conference rooms" to discuss their projects, design issues, statistical analysis, etc.

A recent presentation (Cronk, 1996) on the use of the Web in the research methods course generated considerable interest, as did a presentation on our undergraduate research program (Wann & Cronk, 1996). It is hoped that we can capitalize on this interest and become a clearinghouse for undergraduate research. Students around the country could submit their projects for "publication" on the server, and the electronic conference center could serve as an additional means of communication for undergraduates at various institutions around the country. Undergraduates would be able to collaborate with students at other institutions: share data, ideas, etc. There is already a wide variety of Internet resources for psychologists, but there is no resource specifically devoted to allowing students to share their research experiences with each

other. We are pilot testing a similar “interdisciplinary” model this semester with students from Psychology, Biology, and Nursing at MWSC. If successful, it could easily be extended to encompass other institutions, not just other departments. The equipment necessary for the other goals of this proposal will allow us to accomplish this secondary goal with no additional resources.

(C) Equipment

1. Equipment Requested.

Student/Instructor Workstations. Seventeen computers are being requested to serve as the core of the laboratory. This will provide for one computer to be an instructor’s station and 16 computers for student use. Our computer intensive courses are currently held to a maximum enrollment of 16 students. At the moment, the most cost-effective model of PC is the 120Mhz Pentium. These machines will provide a relatively long life at a moderate cost. All machines will be equipped with 1.2GB hard drives to accommodate all of the required software. 32MB of high speed EDO RAM will be provided to ensure their ability to run current and future versions of software. Gateway 2000 is the current vendor for the state of Missouri, and their machines are of very high quality and provide 3 year warranties.

Network/Internet Server. All machines will be connected to the campus Ethernet network and each workstation will have access to a software server and direct access to the Internet. The server that is being requested will be optimized for use both as a file server (running Windows NT) and a World-Wide-Web server. The WWW server on the college mainframe does not allow departments to write CGI programs for interactive forms, customizable pages, etc. In order to gain this capability a department server is needed. The departmental server will also allow the expansion of the WebBoard program, and the automation of a paper submission process for use in the Undergraduate Research Clearinghouse section of the proposal. Limited disk space is available on the college server and the continuing growth of the department’s web offerings will soon become a problem. A high-end machine is being requested to maximize the life expectancy and increase the versatility of the machine.

Student Data Collection Kits. Four of the 16 student machines will be placed on carts to make them portable and available for use in other rooms. The department has four small “cubicle” rooms available for data collection. Two of those rooms have one-way mirrors for observation. These four machines will be equipped with the “mind drive” interface for recording of basic physiological responses (e.g. galvanic skin response). These four machines will also have simple videoconferencing equipment (Color Quickcam and CU-SeeMe software) so that the four cubicles can be used for experiments in social psychology, and for investigations requiring the use of video.

Automated Data Entry System. A basic full-page scanner is being requested, along with the ReMark OCR package sold by SPSS. This package provides for automated data entry using standard paper and pencil tests rather than op-scan sheets. Subjects are not required to use a #2 pencil. The questions and the answers can appear on the same sheet. Open ended questions can be included and automatically entered into SPSS for analysis.

Software. Funds are being requested to purchase a site license for SPSS for Windows '95. SPSS is the standard in many industries and in the majority of psychology graduate programs. The skills that students learn using this program will enhance their value as scientists, graduate students, and employees. The newest Windows '95 version was selected because of its ease of use, versatility, power, and expected useful life. In addition, it is more reliable than the Windows 3.1 version. Funds are being requested for the Base, Professional, and Advanced Modules. These additional modules are required for many of the procedures conducted in both lower division and upper division psychology courses.

Funds are requested for the expected version upgrade during the second year of the grant. In addition, a site license for the B/C Powerlaboratory package is requested. This package has been in wide use for a number of years as “MacLab.” It has recently been introduced for Windows based computers. It is a highly versatile and accurate software package that provides most classic protocols and the ability to easily modify stimuli, required responses, etc.

The final piece of software that is requested is 16 licenses for the *Sniffy* operant conditioning simulation. This package will be used to replace a five week operant conditioning section in the

experimental psychology laboratory course. A small amount of money (\$150 per machine) is requested for hardware and/or software that is deemed necessary during the second year. The decision about what is needed will be made after careful evaluation of the first year. (See Appendix IV – Implementation Plan).

Accessories. Two printers to connect to the server are being requested. By connecting relatively inexpensive printers directly to a local Windows NT server instead of relying on the college Novell server, two printers can be acquired for the same cost as one Novell compatible printer. One network hub will be required to extend the network to additional machines.

2. Equipment Available Several pieces of equipment are already available for use in the laboratory: (1) a color LCD projection panel for displaying computer screens with an overhead projector; (2) a laboratory with 640 square feet of space to house the computer laboratory; (3) four 64 square foot cubicles (two with one-way mirrors) for conducting research; (4) a Hi8 camcorder and a Truevision full-screen video digitizer which will be used to create multimedia products when the department acquires the workstations needed to play them; and (5) the WebBoard software package for the electronic conferencing required for the Undergraduate Research Clearinghouse component of the proposal; (6) the department also has copies of specialized software that can be accessed with the requested machines. This includes CD-ROM's for Physiological Psychology, Sensation and Perception, and PSS CogReHab software.

3. Equipment Maintenance Newly machines come with a 3-year warranty. Simple repairs can be performed by the college's Computer Center. Sufficient computer expertise is present within the Psychology Department to ensure that the hardware and software in the laboratory are well maintained. Dr. Cronk owns a computer hardware/software/Internet consulting business and donates his computer services to the psychology department.

(D) Faculty Expertise

Brian C. Cronk, Ph.D. has taught at Missouri Western State College since 1993 when he completed his PhD in Experimental Psychology and Computer Science at the University of Wisconsin – Milwaukee. Several of his published studies in psycholinguistics used computers for

presentation of stimuli, and data collection/analysis. He teaches courses in Statistics, Research Methods, Intermediate Psychology, General Psychology, Cognitive Psychology, and Intermediate Statistics. Dr. Cronk is the lab director for the department. He and Dr. Wann both supervise honors projects and independent research projects. Dr. Cronk is a skilled computer programmer, computer and statistical consultant. In addition to expertise in UNIX and DOS systems, he has programming skills in Pascal, Prolog, LISP, BASIC, and SPSS.

Phil D. Wann, Ph.D. has taught at Missouri Western since 1976. He completed his Ph.D. in Physiological Psychology at Carleton University in Ottawa, Canada, in 1980, with a post-doctoral sabbatical year in 1986-87 in the Department of Neurology, University of Missouri-Columbia Medical School. Up until 1992, when he became Chair of the Missouri Western Department of Psychology, he was the lab director with responsibility for teaching the experimental laboratory course. At present, he teaches the Experimental Psychology lecture, which is taken concurrently with the laboratory. Dr. Wann has experience in a variety of computerized laboratory settings, ranging from operant conditioning animal labs to electrophysiology labs to human brain imaging (computerized tomography; single photon emission computed tomography). Over the past decade, his students have presented more than 50 papers at undergraduate or professional research conferences.

(E) Dissemination and Evaluation

Dissemination. There are several avenues for dissemination of information from the proposed computer laboratory. The principal and co-principal investigator both regularly attend meetings of professional organizations such as the American Psychological Association, American Psychological Society, Midwestern Psychological Association, and the Society for Computers in Psychology. Dr. Cronk has recently presented papers on the use of the Internet to teach the Research Methods Laboratory Course. Dr. Wann is the institutional liaison to the Council on Undergraduate Research (CUR), which has annual meetings and a quarterly newsletter that focus on promoting undergraduate research. These provide an excellent outlet for disseminating outcomes from the ILI project. The products of the laboratory (including all student research

projects) will be distributed on the World-Wide-Web via the department's WWW page (<http://www.mwsc.edu/~psych>). In fact, it is anticipated that the Internet will become the primary method of dissemination of information. Syllabi, lab projects, procedural guides, etc. will be converted to HTML and made available on the Internet. It is hoped that the innovative four component program will become a model for other programs. If the secondary goal of the project is successful, the server established at MWSC will provide storage space for other institutions and could become a clearinghouse for the electronic publication and sharing of undergraduate research products and the research experience.

Evaluation. The impact of the proposed laboratory will be assessed in a variety of ways, including, but not limited to: (1) The number of student presentations made at local, regional, national conventions; (2) The number of student awards won; (3) The number of students admitted to/applying to graduate programs in psychology or other sciences; (4) Number of students completing independent/honors research credits; (5) Grades in affected courses; (6) Enrollment in affected courses; (7) Student attitudes towards scientific research; (8) Student awareness of the importance of scientific literacy; (9) Student evaluations of courses and faculty; (10) GRE Psychology subject test scores; (11) Number of papers on the Student Research Web Site; (12) Number of messages posted on the WebBoard Conferencing Software.

Data are currently available for most of the above measures. This will allow pre/post evaluations, as well as longitudinal studies of the effectiveness of the four components of the primary goal (Basic Research Skills, Statistical Analysis Skills, Data Collection, and Simulation/Demonstration) and the ability to achieve the secondary goal (Undergraduate Psychology Research Clearinghouse).

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Cronk, B.C. (1996, May). Fun, but not just fun and games: The Internet in the Research Methods Laboratory. Presentation made at the Midwestern Psychological Association Convention, Chicago, IL.

Kelley-Milburn, D. & Milburn, M.A. (1995). Cyberpsych: Resources for Psychologists on the Internet. Psychological Science, 6, 203-211.

Wann, P.D. & Cronk, B.C. (1996, June). Using undergraduate research to create a 'student culture' at an open admissions, commuter college. Paper presented at the Council of Undergraduate Research, North Carolina Central University.

Biographical Sketches**Brian C. Cronk**

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EDUCATION:

PhD, May 1993, Psychology, University of Wisconsin - Milwaukee, Milwaukee, WI
Major: Cognition and Perception
Minors: Quantitative Methods, Social Psychology, Computer Science
Dissertation: Semantic and repetition priming with homophones
MA, December 1990, Experimental Psychology, Bradley University, Peoria, Illinois
Thesis: The comprehension of idioms: Familiarity, likeliness, and implications for current theories of idiom comprehension
BS, May 1989, Psychology, University of Wisconsin - Madison, Madison, WI

PUBLICATIONS:

Cronk, B.C. & Faulkner, E.E. (1995). *Instructor's Guide to Accompany Schweigert's Research Methods and Statistics (2nd Printing)*. Pacific Grove: Brooks/Cole.
Cronk, B.C. (1994). *SPSS for Unix Quick Reference Guide*. Missouri Western State College, St. Joseph, MO.
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Schweigert, W.A. & Cronk, B.C. (1992). Ratings of the familiarity of idioms' figurative meanings and the likelihood of idioms' literal meanings among U.S. college students. *Current Psychology: Research & Reviews*, 11, 325-345.

LONG-TERM RESEARCH ASSOCIATIONS:

Schweigert, Wendy A., Associate Professor, Bradley University, Peoria, IL
Lima, Susan D., Associate Professor, University of Wisconsin - Milwaukee

PROFESSIONAL AFFILIATIONS:

American Psychological Society (APS) since 1989, American Psychological Association (APA) since 1990, Midwestern Psychological Association (MPA) since 1990, Midwestern Psychological Association Local Representative, Sigma Xi, the Scientific Research Society since 1991, Society for Computers in Psychology since 1995, Council of Teachers of Undergraduate Psychology since 1995.

REVIEWER SERVICE

Judge, Great Plains Student Psychology Convention (1995).
Software Reviewer, Brooks/Cole Publishing Company (1994).
Text Reviewer, Brooks/Cole Publishing Company (1994).
Judge, Mid America Regional Science and Engineering Fair (1994, 1995).
Reviewer, Sixth Annual (1994) American Psychological Society (APS) Convention.
Reviewer, Fifth Annual (1993) American Psychological Society (APS) Convention.

COMMITTEE SERVICE:

Faculty Senate Vice President, Missouri Western State College (1995-96; 1996-97).
Advanced Placement/Dual-Credit Committee, Missouri Western State College (1996 - current).
Institutional Review Board, Missouri Western State College (1995 - current).
Technology Committee, Missouri Western State College (1994 - current).
Academic Computing Committee, Missouri Western State College, St. Joseph, MO (1994- current)
Access Plus, Research/Database Planning Committee, Missouri Western State College, St. Joseph, MO (1995).
Funding For Results, Student Study Skills Component, Research Committee, Liberal Arts and Sciences, Missouri Western State College, St. Joseph, MO (1995).
Faculty Senate member, Missouri Western State College, St. Joseph, MO (1994-96; 1996-98 terms)
Local Representative, Midwestern Psychological Association (1993 - current).
Computer Committee, Department of Psychology, University of Wisconsin -- Milwaukee, Milwaukee, WI (1991 - 1993)
Graduate School Advisory Committee, Bradley University, Peoria, IL (1989-1990). Chair: Bob Weinstein, Graduate Dean.
Student Advisory Committee, Bradley University, Peoria, IL (1989). Chair: Alan Galsky, Associate Provost

RESEARCH REPORTS SPONSORED BY (non-NSF) GRANTS:

Godley, M.D. & Cronk, B.C. (1990). *Counseling services for domestic violence perpetrators: Service descriptions and recommendations for McLean County*. Bloomington, IL: McLean County Illinois State's Attorney.
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Phil D. Wann

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EDUCATION

Ph.D., 1980, Carleton University, Ottawa, Canada
Major: Physiological Psychology
Minors: Research Methods/Statistics, Psychology of Learning
Dissertation: Differential effects of hippocampal epileptic foci and lesions on learning and memory
M.A., 1972, Carleton University, Ottawa, Canada
Major: Physiological Psychology
Thesis: Amnesic and dissociative effects of kindled convulsions in rats
B.A., 1968, Psychology, University of Missouri-Columbia

EMPLOYMENT

1976-present, Missouri Western State College, St. Joseph, MO
Currently Professor and Chair of Psychology
Courses taught: Physiological Psychology, Experimental Psychology (with lab), Neuropsychology, Motivation & Emotion, History & Systems, Senior Seminar, Human Memory, Behavior Modification, Animal Behavior, Child, General and Intermediate Psychology
1986-87, Visiting Research Associate, Department of Neurology, University of Missouri-Columbia Hospital & Clinics. Conducted studies of cerebral blood flow in patients with strokes, amnesic syndromes, and Alzheimer's Disease; clinical assessment experience with a variety of acquired and developmental neuropsychological disorders, including learning disabilities.
1973-76, Sessional Lecturer, Biopsychology, Carleton University, Ottawa, Canada
1970-73, Graduate Research and Teaching Assistant, Carleton University
Teaching Asst.: Analysis of Variance, Neuroanatomy (graduate), Sensory Processes, Comparative, Statistics, Quantitative (graduate)
1968-70, Military service (U.S. Army). Served major portion of duty in administrative position at United Nations Headquarters, Seoul, Korea. Honorable discharge.

RESEARCH ASSOCIATIONS

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Perlmutter, Lawrence, Professor and Chair of Psychology, Finch University of Health Sciences/The Chicago Medical School, Chicago, IL

REPRESENTATIVE RESEARCH PAPERS

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- Wann, P.D., Gini, A., Tucker, D., Roeltgen, D., & Holmes, R. (1988) Changes in regional cerebral blood flow associated with recovery from hemispatial neglect. *Journal of Clinical and Experimental Neuropsychology*, 10(1), 21.
- Tucker, D., Roeltgen, D., Wann, P. & Wertheimer, R. (1988) Memory dysfunction in myasthenia gravis: Evidence for central cholinergic effects. *Neurology*, 38, 1173-1177.
- McIntyre, D. & Wann, P. (1980) Cortical kindled convulsions: Disruption of inhibitory avoidance. *Physiology & Behavior*, 25, 1-7.

RECENT TEACHING CONFERENCES

- Wann, P.D. & Cronk, B. (1996, June). Using undergraduate research to create a 'student culture' at an open admissions, commuter college. Poster presented at the annual meeting of the Council on Undergraduate Research, Durham, N.C.
- Wann, P.D. & Radmacher, S.A. (1995, July). Active learning across the psychology curriculum. Roundtable presentation at the second annual Teaching Institute of the American Psychological Society, New York, NY.
- Wann, P.D. (1995, January) Eyewitness memory: An active learning exercise for the classroom. Teaching activity poster presented at the 17th annual National Institute on the Teaching of Psychology, St. Petersburg, FL.
- Wann, P.D. (1994, July) A team-taught senior capstone course for psychology majors. Teaching activity poster presented at the first annual Teaching Institute of the American Psychological Society, Washington, D.C.
- Participant in National Science Foundation Short Courses "Neurobiology of Mind" held at Duke University (1996) and "Constructive Processes in Learning and Teaching" held at University of Texas-Austin (1994).

AWARDS/HONORS

- Missouri Governor's Award for Excellence in Teaching, 1993
- MWSC Jesse Lee Myers Award for Excellence in Teaching, 1990 and 1993
- Burlington Northern Foundation Faculty Teaching Award, 1988
- MWSC Liberal Arts & Sciences Distinguished Faculty Lecturer, 1988
- Gold Medal Award, Best Scientific Exhibit, Society for Nuclear Medicine, 1987
- [Gini, A., Wann, P., Tucker, D., Roeltgen, D., & Holmes, R. (1987) Cerebral perfusion studies using TC-99-m-d, 1, HM-PAO in hemispatial neglect: Some evidence for a thalamic role. *Journal of Nuclear Medicine*, 28 (4), 760.]

PROFESSIONAL AFFILIATIONS

International Neuropsychological Society; American Psychological Association; American Psychological Society; Midwestern Psychological Association; Council on Undergraduate Research; Association for Psychological and Educational Research in Kansas; Missouri Academy of Science (Chair, Psychology Section, 1980-81, 1983-86)

Budget

<i>ITEM</i>	<i>Number</i>	<i>Unit Price</i>	<i>Total Cost</i>	<i>Subtotal</i>
(1) Scientific and Computing Equipment				\$56,850.95
COMPUTERS				
Student Workstations				
Gateway Pentium 120MHz, 32MB RAM 1.2GB Hard Drive, Ethernet, Keyboard 15" monitor, Mouse, 2MB Video card	16	\$1,975.00	\$31,600.00	
Instructor Workstation				
Gateway Pentium 120MHz, 32MB RAM 1.2GB Hard Drive, Ethernet, Keyboard 15" monitor, Mouse, 2MB Video card	1	\$1,975.00	\$1,975.00	
Network and Internet Server				
Gateway Pentium Pro 200, 64MB RAM 2GB SCSI Hard Drive, Tape Backup Keyboard, Mouse, Monitor Uninterruptible Power Supply, PCI Ethernet	1	\$4,006.00	\$4,006.00	
Student Data Collection Kits				
"Mind Drive" Computer Interface and Software	4	\$504.00	\$2,016.00	
Color Quickcam video camera and interface		\$190.00	\$190.00	
CU-SeeMe Videoconference Software		\$229.00	\$229.00	
		\$85.00	\$85.00	
Automated Data Entry System				
Page Scanner	1	\$760.00	\$760.00	
ReMark OCR Software designed for hand written surveys/SPSS Interface		\$400.00	\$400.00	
		\$360.00	\$360.00	
SOFTWARE				
SPSS for Windows '95 Base Module	Site License	\$1,350.00	\$1,350.00	
SPSS Professional Module	Site License	\$3,713.00	\$3,713.00	
SPSS Advanced Module	Site License	\$3,713.00	\$3,713.00	
SPSS year 2 upgrade license	Site License	\$600.00	\$600.00	
B/C PowerLaboratory Software	Site License	\$2,119.95	\$2,119.95	
Sniffy the Virtual Rat Software	16	\$53.00	\$848.00	
Year 2 Hardware/Software Upgrades	17	\$150.00	\$2,550.00	
ACCESSORIES				
NEC860 (or equiv) 8ppm laser printer	2	\$550.00	\$1,100.00	
Network Hubs (Concentrator)	1	\$500.00	\$500.00	
(2) Construction of Equipment				\$0.00
(3) Equipment Assembly				\$0.00
(4) Safety Equipment				
(5) Shipping Costs				\$0.00
(6) Required Taxes				\$0.00
TOTAL PROJECT COST				\$56,850.95
Non-NSF Contribution				\$28,425.48
NSF Request				\$28,425.48

Appendix I.a.
List of Major Equipment Available in Department for Undergraduate Research

<u>Equipment</u>	<u>Purchase Date</u>	<u>Cost</u>
Auto Projection Tachistoscope	1973	\$398
Human Operant Package with Token and M&M Dispenser	1973	\$1435
Memory Drum	1973	\$455
6-channel Recorder	1974	\$315
Extended Delay Recorder	1975	\$887
Rodent Preference Chamber	1976	\$350
Strobe Light	1976	\$350
Fixed Behavior Generator	1976	\$450
Super 8 Power Supply	1976	\$845
Clock Counter	1976	\$398
Projector and Motion Analyzer	1976	\$1795
Electromyograph Biofeedback	1976	\$425
Audio GSR Biofeedback	1976	\$398
Master Shocker for Rodent Mazes	1976	\$295
Electrolytic Lesion Producing Device	1979	\$258
Stereotaxic Drill	1979	\$328
Rodent Stereotaxic Device	1979	\$295
Brain Stimulator	1980	\$295
Four Channel Psychophysiology Recorder	1981	\$4697
Rat Stereotaxic Instrument	1982	\$938
Square Wave Stimulator	1983	\$295
Rodent Activity Platform	1984	\$395
Solid State Rodent Operant Systems (2)	1984	\$2276
Rodent Operant Chambers (6)	1970s/80s	\$1500
Apple IIe with Interfacing for Operant Chambers	1986	\$3000
Apple IIe (used for statistics; interfacing with lab equipment)	1984	\$1408
Solid State Audiometer	1985	\$795
Multichoice Reaction Timer	1985	\$1000
Tissue Slicer	1985	\$325
Neuropsychological Assessment Battery	1989	\$1050
Illusionator	1994	\$350
Autogenics Temperature Monitor	1994	\$735
RCA Hi8 Camcorder	1996	\$750
Truevision Bravado 1000 Full Screen Video Digitizer	1996	\$869

**Appendix I.b.
Requirements for the Psychology Major and
Descriptions of Courses Directly Affected by ILI Proposal**

REQUIREMENTS FOR THE PSYCHOLOGY MAJOR:

Courses in ***bold-italics*** are directly influenced by this grant (See Appendix II). Courses in **bold only** are the primary courses affected by this grant.

1. ***General Psychology (PSY101)***
 2. ***Intermediate Psychology (PSY200)***
 3. **Psychological Statistics & Measurements (PSY300)**
 4. **Experimental Psychology (PSY301)**
 5. **Experimental Psychology Laboratory (PSY302)**
 6. ***History & Systems in Psychology (PSY430)***
 7. ***Senior Seminar (PSY490)***
 8. Natural Science Core (Choice of Two)
 - Cognitive Psychology (PSY330)***
 - Learning (PSY335)
 - Animal Behavior (PSY345)
 - Physiological Psychology (PSY350)***
 - Sensation & Perception (PSY355)***
 - Motivation & Emotion (PSY360)
 9. Social Science Core (Choice of Two):
 - Psychology of Communication (PSY305)
 - Industrial/Organizational Psychology (PSY310)***
 - Child Psychology (PSY319)
 - Psychology of Personality (PSY325)
 - Social Psychology (PSY365)
 10. Two Electives (May be chosen from additional courses in the Natural or Social Science Cores or from the courses below):
 - Mental Hygiene (PSY210)
 - Health Psychology/Stress Management (PSY220)***
 - Psychology of Gender (PSY222)
 - Behavior Modification (PSY250)***
 - Abnormal Psychology (PSY309)
 - Adulthood and Aging (PSY321)
 - Psychological Testing and Assessment (PSY400)
 - Introduction to Counseling Psychology (PSY410)
 - Intermediate Statistics for the Behavioral Sciences (PSY415)***
 - Psychology of the Exceptional Child (PSY419)
 - Practicum in Psychology (PSY420)
 - Independent Research (PSY480)***
- Total Credits Required for the General Psychology Major = 37 hours

Note: Missouri Western State College also has a Personnel Psychology program which includes a cognate field in business; however, the first five course requirements listed above are also included in that program.

CATALOG DESCRIPTIONS OF PRIMARY COURSES AFFECTED BY THE PROPOSAL:

PSY 300 Psychological Statistics and Measurements. Considers contemporary methods of inventorying individual differences, and the theoretical basis for criteria in constructing, standardizing, and using test instruments, with a brief theoretical introduction and critique of the misuse of psychological tests. Prerequisite: PSY 101, 200 and satisfactory completion of the math requirements for general studies. Computer intensive. Three hours credit, offered every semester. Maximum enrollment, 25.

PSY 301, Experimental Psychology. Provides training in the techniques and methods of scientific psychology; emphasizes construction of hypotheses, experimental design, data interpretation, and style of reporting research. Ethics intensive. Prerequisite: PSY 101, 200, 300. Three hours credit, offered every semester. Maximum enrollment, 16.

PSY 302, Experimental Psychology Laboratory. Laboratory experience in designing and conducting psychological research, data analysis and writing research reports. Must be taken concurrently with PSY 301. Two hours credit, offered every semester. Maximum enrollment, 16.

PSY 415, Intermediate Statistics for the Behavioral Sciences Applies basic statistical procedures to behavioral research; considers some statistical procedures not taught in MAT 201, and the use of computers in data analysis. Two hours lecture, two hours lab. Prerequisite: PSY 301 or MAT 132. Maximum Enrollment, 12.

PSY 480 Independent Research. Research on selected topics or problems on an individual conference basis. Prerequisite: Consent of Department Chairperson. 1-5 hours credit depending on the extent of the project; offered every semester. (Honors students enroll in two consecutive 3-credit PSY 480 honors courses.) Maximum enrollment, 5.

Appendix I.c.
Number of Psychology Students in Last Five Years

1991-92:*

Psychology Graduates: 40
Students enrolled in psychology classes: 2044

1992-93:

Psychology Graduates: 30
Students enrolled in psychology classes: 1979

1993-94:

Psychology Graduates: 39
Students enrolled in psychology classes: 2094

1994-95:

Psychology Graduates: 26
Students enrolled in psychology classes: 2041

1995-96:

Psychology Graduates: 33
Students enrolled in psychology classes: 2155

Beginning in 1991, students were required to apply to enter the psychology program, with admission on a competitive basis. Because of limited faculty resources, only 30-32 are admitted each year, which accounts for the decline in the number of psychology graduates starting in 1994-95.

Appendix I.d.**Recent Psychology Student/Faculty and Student Research Papers**

(Students are identified in bold type and by asterisks)

Research Articles/Abstracts:

- ***Cutsinger, M.**, Dragsten, E., Sabo, H. et al. (1996). A practical guide to conducting the dreaded literature review. *Journal of Psychological Inquiry*, 1, 41-43.
- ***Davies, S.A.** (1996). Avoidant personality trait: A predictor of night work adaptability? *National Council on Undergraduate Research Abstracts*.
- ***Maggart, T.** (in press). William James on free will and determinism. *Journal of Psychological Inquiry*. (Presented at the Great Plains Student Psychology Convention).
- ***Markt, C.** & Johnson, M.A. (1993). Transitional objects, pre-sleep rituals, and psychopathology. *Child Psychiatry and Human Development*, 23 (3). Spring. (Presented at the Great Plains Students' Psychology Conference and the Missouri Academy of Science meeting.)
- Wann, P.D., ***Ballard, L.** & ***Lade, B.** (1991) Sweet recall: Glucose enhancement of memory in middle-aged humans. *Journal of Clinical and Experimental Neuropsychology*, 13(1), 18. (Presented at the annual meeting of the International Neuropsychological Society, San Antonio, TX.)
- Wann, P.D., ***Johnson, A.** & Daffron, J. (1992) Glucose effects on memory and other cognitive functions in middle-aged humans. *Journal of Clinical and Experimental Neuropsychology*, 14(1), 88. (Presented at the annual meeting of the International Neuropsychological Society, San Diego, CA.)
- Wann, P.D., & ***Johnson, A.** (1992) Glucose effects on cognitive functions in middle-aged adults. *The Clinical Neuropsychologist*, 6(3), 346. (Presented at the annual meeting of the American Psychological Association, Washington, D.C.)
- Wann, P.D. & ***McRoberts, G.** (1993) Effects of glucose on memory: Test of a state-dependent retrieval hypothesis. *The Clinical Neuropsychologist*, 7(3), 353. (Presented at the annual meeting of the American Psychological Association, Toronto, Canada.)
- Wann, P.D. & ***Ballard, L.** (1994) Post-trial glucose enhancement of memory in middle-aged adults. *Archives of Clinical Neuropsychology*, 9(2), 198-199. (Presented at the annual meeting of the National Academy of Neuropsychology, Phoenix, AZ.)

Regional/National Conference Presentations:

- ***Davies, S.** (1996). Personality and night work adaptability. Presented at the annual meeting of the National Council on Undergraduate Research, University of North Carolina – Asheville.
- ***Johnson, A.** (1991) Glucose effects on memory and other cognitive functions. Presented at the national conference of Alpha Chi Honor Society, Orlando, FL.
- Johnson, M.A., Mullins, P. & ***Burnham, J.** (1993) Spirituality: Conceptualization and measurement. Presented at the annual meeting of the American Psychological Association, Toronto, Canada.
- ***Riggs, A.** (1991) Cognitive style and creativity in gifted and nongifted children. Presented at the national conference of Alpha Chi Honor Society, Orlando, FL.
- ***Smith, S.** (1994) Prediction and educational attitudes of college faculty and students. Presented at the annual meeting of the National Collegiate Honors Council, San Antonio, TX.
- Wann, P.D. & ***Riordan, J.** (1996) Effects of glucose on emotional and nonemotional memories in middle-aged adults. Presented at the annual meeting of Midwestern Psychological Association, Chicago, IL.

Award-Winning Missouri Academy of Science Presentations:*

- ***Bassett, V.** (1995) The effect of size of city where raised on self-efficacy level.
- ***Beaty, J.** (1993) The effects of timing and magnitude of justification on attitude change: A forced compliance study.
- ***Bohon, S.** (1992) Attitudes of college students towards sexual harassment on campus.
- ***Eckhoff, D.** (1992) Psychological defenses and gender differences A jury simulation study.
- ***Fasching, S.** (1993) Age differences among preschoolers in social development through parallel play.
- ***Goings, K.** (1993) The emergence of semantic clustering in elementary school children.
- ***Markt, C.** (1990) Personality, sleep disturbances and sleep preparation rituals.
- ***Phillippe, P.** & ***Schoenhair, S.** (1996). Trait anxiety and memory of emotional and nonemotional events.
- ***Roderick, R.** (1990) Out of joint: Criticisms of the self-monitoring construct.
- ***Schmitt, T.** (1995) The effects of extrinsic rewards on intrinsic motivation in recovering substance abuse counselors: A cross-sectional study.

Great Plains Students' Psychology Convention Presentations:*

- ***Ambrose, S.** (1996) Discrimination against the obese in the hiring process
- ***Bayne, J.** (1995) The impact of evidence and extralegal factors in jurors' decisions.
- ***Beaty, J.** (1994) Cognitive dissonance returns: An old theory to gather around.
- ***Brinkley, E.** (1995) Marital role expectations and relationship satisfaction.
- ***Cilke, C.** (1995) The relationships between loneliness and self-esteem.
- ***Davies, S.** (1996) Avoidant Personality Trait: A Predictor of Night Work Adaptability?
- ***Dodds, R.** (1993) Adult children of alcoholics: Issues and treatments.
- ***Eckhoff, D.** (1991) Fear of success: A valid construct?
- ***Fasching, S.** (1995) I killed them because the Chiefs lost: An insight into spectators' aggression.
- ***Hammen, W.** (1996) How the family and environment affect juvenile delinquency
- ***Hoer, A.** & ***Goings, K.** (1993) The effects of glucose on short term memory in middle-aged adults.
- ***Jeffers, S.** (1995) The effect of causal attribution on affective response to persons with AIDS.
- ***Kolb, K.** (1996) Domestic violence: Its effect in children
- ***Lade, B.** (1990) Internal vs. external locus of control: Its origin and application.
- ***Maggart, T.** (1996) Founder of American scientific psychology: William James on free will vs. determinism
- ***Marion, R.** (1995) Mary Whiton Calkins: Pioneer woman psychologist.
- ***Ortmeier, J.** (1994) Demonology: Past and present practices and perspectives:
- ***Ortmeier, J.** & **Smith, S.** (1994) Visuospatial ability: Hemispheric dominance and menarche in females.
- ***Prenger, L.** (1993) A critical review of social learning theory.
- ***Schmitt, T.** (1996) The effects of extrinsic rewards on intrinsic motivation in recovering substance abuse counselors; A cross-sectional study
- ***Schoenhair, S.** (1996) The development of Children's Memory: Normative Data
- ***Van Ness, C.** (1994) Attitudes toward breast and testicular self examination.
- ***Velasquez, M.** (1996) A comparison of information processing styles between African-American and Euro-American college students.
- ***Venneman, J.** (1990) Effects of biofeedback and an empathy development technique on alpha and theta brainwave synchrony.

**Note: Because of space limitations, only award-winning papers have been listed for the Missouri Academy of Science and Great Plains Students' Psychology Conventions. Since 1990, Missouri Western State College psychology students have presented more than 150 papers in these undergraduate paper competitions.*

Appendix II Anticipated Curriculum Changes and Innovation

It is anticipated that eventually *all* of our courses will be changed by this laboratory. Changes to Statistics (PSY300), Research Methods Laboratory (PSY302), Intermediate Statistics (PSY415), and Independent Research (PSY480) have been discussed in the Narrative. The purpose of this appendix is to illustrate the types of changes that will occur in our other courses.

Potential for Adding Laboratory Component:

- PSY335 - Learning
- PSY340 - Cognitive Psychology **
- PSY350 - Physiological Psychology **
- PSY355 - Sensation and Perception

Interactive CD-ROM's or Multimedia Study Guides Available

- PSY101 - General Psychology
- PSY200 - Intermediate Psychology **
- PSY220 - Health Psychology/Stress Management
- PSY250 - Behavior Modification
- PSY350 - Physiological Psychology **
- PSY355 - Sensation and Perception **

Requirement for Student Internet Use

- PSY200 - Intermediate Psychology **
- PSY310 - Industrial/Organizational Psychology
- PSY430 - History and Systems in Psychology **
- PSY490 - Senior Seminar

** Taught by PI or Co-PI.

Appendix III
Examples of Planned Additional/Innovative Activities
in Research Methods Laboratory Course

1. **Replication of Classic Studies.** Using the B/C Powerlab software, students will work in pairs or individually to replicate classic studies using themselves as subjects. These examples provide understanding into the classic findings and paradigms of psychology. Examples are:
 - Interference and the Stroop Effect
 - Mental Rotation of Images
 - Memory Span
 - Additive Factors Logic/ Sternberg Memory Scanning
2. **Illustration of Research Methods Concepts.** The B/C Powerlab software will be used to illustrate the effect of and importance of several topics discussed in the experimental psychology lecture. These topics have generally been discussed in a very abstract way. The equipment will provide concrete examples and direct comparisons of different methods. Examples are:
 - Randomization
 - Counterbalancing
 - Practice Effects, Fatigue Effects
 - Floor Effects/Ceiling Effects
 - Repeated Measures Designs vs. Between Subjects Designs
 - “Good Subject” effects, Response Sets
3. **Student Collaboration.** The WebBoard software on the server will be utilized to facilitate discussion among the students. This will amount to a brainstorming session where students can get ideas for their independent projects and share methodological difficulties. Because of geographical and scheduling constraints, such collaborative sessions have not been previously possible.
4. **Data Entry.** The equipment requested will be used to automate data collection and data entry. This will reduce coding errors, and allow students to spend more time on design and analysis issues rather than clerical tasks. It will also allow increased versatility. For example:
 - WWW based forms
 - Automatic timing via B/C Powerlab
 - Flexible survey design using ReMark software
 - *Increased sample sizes* in student research because of decreased data entry time
5. **Simulation.** The *Sniffy* program will be used to simulate operant conditioning. This section of the lab has been eliminated recently, and the use of simulation will provide an efficient, clean, safe, ethical, cost efficient way for students to study the following topics:
 - Single Subject Designs
 - Shaping through successive approximations
 - Reinforcement Schedules
 - Extinction and Spontaneous Recovery
 - Superstitious Behavior
6. **Studies of Technology.** The equipment will allow Dr. Cronk and his lab classes to investigate the impact of technology on communication between people and on the learning process. This will be accomplished through investigations of the following issues (and others):
 - Response rates for in-person, phone, paper flyer, Email, or videoconference requests

- Time Perception for computerized and manual tasks.
 - Privacy and the Internet - the role of “ownership” of the equipment
 - Communication and Social Status - subordinates sending email to superiors vs. Superiors communicating with subordinates
 - Effectiveness of communication over a distance (via phone, Email, video) on social behavior (e.g. altruism, prisoner’s dilemma, etc.)
7. **Enhancement of Individual Projects.** The equipment requested will provide the most benefit in terms of allowing students to improve the type and quality of independent projects that they conduct in the Research Methods Lab. Class and for Independent Research credit. Examples of improvements expected include:
- Increased sample size because of enhanced data entry procedures
 - Increased collaboration during the planning, data collection, analysis, and reporting stages
 - Increased ability to conduct their own powerful statistical analyses
 - Increased access to a large variety of paradigms and procedures

**Appendix IV
Implementation Plan**

24 months from anticipated starting date (June 1997 - June 1999)

June, 1997: Finalize remodeling plans for laboratory space. Schedule remodeling with college Physical Plant. Obtain final prices and configurations for NSF sponsored equipment. Schedule network wiring with college Computer Center.

July and August, 1997: Remodeling of physical space. Hardware/software orders placed.

Fall, 1997: Use 3 credit hour load reduction to set-up hardware/software. Pilot test laboratory using Research Methods Laboratory course. Open lab for limited in-class projects. Migrate existing data/software to new systems. Finalize the structure of departmental WWW and Network server.

Spring, 1998: Open lab for full student access. Migrate all computer intensive courses to new laboratory. Emphasize student use for data collection and independent/honors projects.

Summer, 1998: Evaluate Spring laboratory usage. Using evaluation data and student/faculty suggestions, order additional software/hardware needed. Evaluate curriculum changes necessary to enhance the use of the laboratory. Finalize mechanism for research clearinghouse component. Solicit participants for clearinghouse.

Fall, 1998: Hold workshops for faculty on the use of computers in teaching. Submit evaluation data for presentation at regional/national teaching conference. Finalize plans for the addition of laboratory components to the Natural Science core courses. Disseminate evaluation data using World-Wide-Web and Email listserv mechanisms.

Spring/Summer, 1999: Submit final report of ILI project to the National Science Foundation/Missouri Western State College Foundation. Continue evaluation and dissemination.

Appendix V
Endorsements of College Officials

See Pages Following
