UW Colleges Senate Policy

General Institutional Policy #404.01
Protocol Forms for Review by the Institutional Review Board
Adopted by the Senate May 2, 2003
Revised January 16, 2008 (Prior to this date the Colleges Institutional Review Board was known as the “Colleges Senate Research Review Committee”)

I. Form A

INSTITUTIONAL REVIEW BOARD PROTOCOL
FOR RESEARCH PROJECTS INVOLVING HUMAN OR ANIMAL SUBJECTS
________________________________________________________________________
IRB USE ONLY

Date Received: ________________________

Date Approved: ________________________

Re-approval Date: ________________________

Re-approval Date: ________________________

IRB Chair Signature:___________________________________________________

This application is to be submitted to the Institutional Review Board prior to the initiation of any investigation involving human or animal subjects or material. Seven copies, plus the original signed form, should be sent to the Board chair.

NOTE: Some projects involving minimal risk may qualify for an Expedited Review. If your project qualifies, three copies, plus the original signed form, need to be submitted to the Board chair.

Are you requesting an Expedited Review? _______Yes      ______No
A. FACE SHEET (please type)

DATE: 8/25/2009

PROJECT TITLE:

UWS Leadership Site for the Scholarship of Teaching and Learning - Threshold Concepts and Diversity Initiative

PRINCIPAL INVESTIGATOR:

Dr. Sarah Bennett  Assistant Professor of Mathematics (Tenure Track)

UW-BC  Mathematics  715-234-2239 ex 5477

SUPPORTING AGENCY (if applicable)

(Name)  (Grant number)

Is the project federally funded? No

NOTE: If project is federally funded, please provide a name and address of the individual to whom official notification (HHS form 596) should be sent.

SIGNATURES:

Principal Investigator: ________________________________

Department Chair: ________________________________ (if required)

Faculty Sponsor: ________________________________ (required if principal investigator is below the rank of Instructor)

Note: I understand that I must renew my IRB application each year of this study. My faculty colleague received my proposal last month and was fine with it. He suggested I change "anxiety" in the survey and I did. We will have a departmental meeting to discuss the research project with the other two instructors. I am no longer comparing teaching methods but instead am focussing on problem solving and other threshold concepts and what role diversity plays in that, if any.

B. DESCRIPTION (refer to Procedures)

1. Purpose
I propose to research helping students with the threshold concept of problem solving (by focusing on Polya’s steps), other student identified threshold concepts, and implementing non-traditional mathematics instruction to see how this helps the student to succeed in mathematics. This research would give us the opportunity to draw more information about the characteristics of academic and racial diversity and what students identify on their own as their threshold concepts. Also, during the 3 semesters of data gathering, after the initial revision stage the 1st semester, it will be informative to look at how each math instructor may affect student responses to the threshold concepts as well. We have a consistent curriculum for the MAT 110 course at our campus, will be covering the same material, and have the same grading structure, so the data gathered should be more reliable because of this consistency in this course.

2. Duration of Project: from Fall 2009 through Spring 2011

Complete part 3 (a) if using human subjects and part 3 (b) if using animal subjects.

3 (a) Human Subject Selection

Number of subjects
Those enrolled in MAT 110 for one section of each for Fall 2009, then for all sections MAT 110 afterwards during Fall and Spring semesters.

How are subjects to be recruited and by whom?
For the first semester a pre and post questionnaire will be given in Dr. Bennett's course after students sign the agreement to participate in this research. Subjects are not recruited but are asked to participate if they are in MAT 110.

The protocol proposes to include as subjects:

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>pregnant women</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mentally infirm</td>
<td></td>
<td></td>
<td>fetuses</td>
<td></td>
</tr>
<tr>
<td>mentally retarded</td>
<td></td>
<td></td>
<td>abortuses</td>
<td></td>
</tr>
<tr>
<td>patients</td>
<td></td>
<td></td>
<td>minors</td>
<td>x</td>
</tr>
<tr>
<td>students</td>
<td></td>
<td></td>
<td>prisoners</td>
<td></td>
</tr>
</tbody>
</table>

3 (b) Animal Subjects - None

4. Location of study.

This study takes place in the UW-Barron County mathematics classrooms only.

5. Background

At UW-Barron County, students come with diverse ages, skill levels, preparation levels, expectations, and senses of self-efficacy in mathematics. This is the academic diversity we have at our campus. While our student population is limited in terms of racial
diversity, our campus is actively trying to recruit more diverse students and does have a growing Somali population. The focus for this study is on the academic diversity that is a hallmark of our classrooms and racial diversity where possible, both types of diversity that are addressed by similar considerations of pedagogy. In *The teaching gap: Best ideas from the world’s teachers for improving education in the classroom*, by James W. Stigler and James Hiebert (2009) the authors describe methods of teaching that have been shown to help students learn mathematics. Nelson (1996) argues that traditional math and science instructional methods actually “discriminate” against students from non-traditional backgrounds (Nelson, 1996, p.165). By teaching in a more student-centered way where students are actively engaged in doing mathematics in the classroom, working with other students, and explaining their work to others, the pedagogy used will address what the research shows about the needs of at-risk students (academically under-prepared, first-generation college students, etc.) and students from racially diverse backgrounds—the diversity that already exists on our campus and one that’s emerging.

One key threshold concept in mathematics is problem-solving strategies. Most students struggle with how to solve mathematics problems, especially the less-skilled students. While problem-solving strategies would be very helpful, they are rarely taught in mathematics courses. (George Polya outlined 4 steps to problem solving. First, you have to understand the problem. Second, find the connection between the data and the unknown. Third, carry out your plan. Fourth, examine the solution obtained.) I would like to initially explore this threshold concept that is particularly important for understanding and learning in mathematics. Problem solving is the way mathematicians think and solve problems. I will emphasize Polya’s 4 steps in Mathematics 110 while implementing some of the non-traditional mathematics instruction described by Stigler and Hiebert, and Nelson. Examples are: having students work together, having students write problems on the board and help one another, having students explain their work and thinking, having students read sections of the textbook out loud and discuss understandings and misunderstandings. Through observation and the survey described below, I will also look at how understanding problem solving assists students in overall success in any mathematics topic.

Recently, the mathematics department received data about passing rates for our students. This data showed us that the passing rates at our campus are in line with the rest of the UW Colleges. The rates, especially in the lower-level courses populated by our at-risk students, are low and we would like to see them improve along with the transfer rates for students to continue to take more mathematics courses. The data showed for Mathematics 110 a success rate of 56.8% at the UW Colleges and 63.6% at UW-BC. Yet, there was much information we could not conclude because we have limited data. This research would give us more insight into these students and how to possibly assist them in succeeding.

**References:**
6. Research Design

My preliminary plans for research design are as follows. Given the correlation between success and confidence and understanding in mathematics, my broader goal is to gain more information on the students, to help understand where they struggle with mathematics and why, and to examine their level of confidence in mathematics. Collecting data on these issues will help to understand the specific student population in the mathematics department at UW-Barron County. The relevant teaching and learning questions I would like to investigate appear below in a pre and post semester survey that I would give to my mathematics 110 class in the Fall 2009 semester. After analyzing the data and making any needed revisions to the survey, we would then continue to give the survey to all UW-Barron County sections of mathematics 110 in the Spring 2010 semester through the following Spring 2011 semester. With 1 semester of fine tuning and 3 semesters of further data gathering, we could gain insight into which concepts are most critical in these two core courses. After that, other campuses may be interested in using the survey to gain information about their students as well.

More specifically, I will also look at what students identify as their threshold concepts. They may explicitly identify something more basic or mechanical, but their answers may reveal something more significant and different from what I anticipate with problem solving in general. I will observe their classroom behavior and their work with problem solving to identify specific moments of difficulty, resistance, and hopefully epiphany. With these findings, I will analyze the survey data to see how previous coursework, types of study, self-efficacy, and self-identified difficulties correlate with their response to the threshold concepts. I will also analyze how each instructor’s class responds to the survey, so the survey will be used as an informative tool for the instructors as well. I will organize the data by class so instructors can receive feedback from the surveys and learn from the results. Instructors at the campus can then reflect and discuss how they help their students deal with threshold concepts. I will be able to do this in the Spring 2010 through the Spring 2011 semesters.

At the end of this document is the draft of the pre and post survey to be given at the beginning and end of Fall 2009 semester, then revised, and with IRB approval, given the following 3 semesters, pre and post each semester. Resulting data will be organized and conclusions made from the results. Further, to address the specific threshold concepts that emerge and the problem solving concept, a focus on them in the teaching, assessments, and the gathering of other data will be done during the semester and will be considered as well. This may take the form of a short writing assignment, discussions on problem solving, or keeping a journal for students to write in about their learning mathematics. These activities will fall under the normal workload for the course. Other
instructors may or may not implement them but they will have their students complete the pre and post survey. A short summary of the results will be written up. This work will inform the department and our teaching by providing multiple levels of information, data, and feedback from our students. My findings about specific threshold concepts will also inform our department’s efforts to increase passing rates in our core courses. In addition, I plan to publish and share this information and to make it accessible and designed for others to use, beyond my department.

If a student declines from participating in the research, the activity they will not partake in is the pre and post survey. During the survey the nonparticipating student will work on a math worksheet provided. For other data collected during the semester, it would be part of the course and fall under normal course work. This work would not be part of a grade so the nonparticipating students will not be penalized in any way.

C. Human Subjects
These general headings must be followed. Refer to Procedures section.

1. Subject population - all students consenting and enrolled in MAT 110

2. Potential risks
Taking the survey does not pose any critical risk. It does however encourage students to reflect on their mathematics background, thoughts and feelings they have about mathematics, including providing some data about themselves.

3. Expected benefits for subjects (if any) and/or society
Benefits include gains in self-awareness around mathematics and success for the participating student. Benefits also include gains for UW-Barron County and the mathematics department, providing data from research.

4. Consent procedures (Also see General Institutional Policy #404.01.II for a sample consent form)
IRB consent form

5. Protection of subjects
Students will only be identified by the last four digits of their student identification number. This ensures their anonymity.
II. Form B.

INFORMED CONSENT

Invitation: You are invited to participate in this research, which involves the gathering information about you and your thoughts about mathematics and will be administered in MAT 110 classes. Your participation in this research is voluntary and you may decline at any point to continue to participate. The goal of this research project is to identify where students struggle with mathematics, what some of your perceptions are around mathematics and problem solving, and to examine what role students different backgrounds play in terms of how math is taught and how students respond to different kinds of teaching and learning.

Procedures and Purpose: In this research you will be asked to complete a short pre and post semester questionnaire. Your survey will be identified by the last four digits of your student identification number only so we can track your pre and post results but we will not be able to identify you by name. Each pre and post survey will take about 10 minutes of your class time. You may also do short writing assignments or journal entries throughout the semester. These may be used in a research paper or report but will not identify you in any way. If you do not participate in the research any work or writing you do will not be used.

Benefits: Although you will not be paid nor given any course credit for your participation in this experiment, it is hoped that it will be an educational experience for you. You will have the opportunity to receive a summary of the results and a discussion of the findings at a later date.

Risks: Taking the survey does not pose any critical risk, it does however encourage you to reflect on your mathematics background and thoughts and feelings you have about mathematics including providing some data about yourself.

Confidentiality and Disclosure: Your responses in this experiment will be completely confidential. A number will be applied to your ratings and your name will never be identified with your specific responses. Only group responses will ever be published or presented to others. Anonymous work or writings may be used as well.

Disclaimer and Clarification: You are free to withdraw from participation at any time. Before you sign this form, please ask questions concerning any aspects of this study that are unclear to you. If you choose not to participate in this study then while the pre and post surveys are given you will, instead of doing the survey, work on a mathematics worksheet that will be provided.
AUTHORIZATION BY THE PERSON AGREEING TO PARTICIPATE IN THIS RESEARCH

I have read this consent form and I voluntarily agree to participate. I understand that I will fill out a survey at the beginning and at the end of the semester. By signing, I agree to participate in this research.

____________________________________   ___________________
Subject’s signature                       Date

If you are under the age of 18 please include your parent’s signature

__________________________________________   ___________________
Parent’s signature                        Date

If you do not wish to participate please sign below:

__________________________________________   ___________________
Signature                                  Date

You may contact the investigator with any questions or concerns you may have:

Dr. Sarah Bennett   715-234-8176 ex 5477
1800 College Drive, Rice Lake, WI   54868

sarah.bennett@uwc.edu

If you have additional questions or concerns about this study that you do not wish to share with the investigator, you may contact the chairperson of the Institutional Review Board:

Linda Tollefsrud
Professor of Psychology
University of Wisconsin - Barron County
1800 College Drive
Rice Lake, WI  54868
(715) 234-8176
linda.tollefsrud@uwc.edu
III. Form C

TERMS AND ABBREVIATIONS

Assurances: The “assurances” document guarantees the Department of Health and Human Resources that all research conducted under the auspices of the UW Colleges will be review according to the rules and regulations specified by 45 CFR 46, as revised March 8, 1983, and June 18, 1991.

Belmont Report, The: A report of the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (1978), which was adopted as a statement of policy by the DHHS. This report, published in the Federal Register, contains ethical principles that guide the work of the IRB.

Category I: Research with “no apparent risk” to subjects, as defined in 404.I.B.1.

Category II: Research that involves only “minimal risk” to subjects. Examples are included in 404.I.B.2.

45 CFR 46: A section of the Code of Federal Regulations (title 45, part 46) that explicates the rules and regulations under which IRBs function.

DHHS: The Department of Health and Human Services.

Expedited Review: An abbreviated review process that may be undertaken if research meets the criteria for Category II.

HHS 596: A form submitted to DHHS by an IRB to confirm that federally funded research has been approved.

Human Subjects: Any living individual about whom an investigator conducting research obtains (1) data through intervention or interaction with the individual or (2) identifiable private information. See also 45 CFR 46.

Informed Consent: Subjects are generally assumed to have given informed consent if they have a reasonable amount of information about the study to be conducted, if it is clearly comprehensible to them, and if their decision to participate is initially, and continues to be, completely voluntary. See also Guidelines and 45 CFR 46.

IRB: Institutional Review Board. IRBs are mandated by the National Research Act of 1974 for any institutions that receive federal funds for research. This board is charged with reviewing research to insure that it meets the ethical standards of respect for persons, beneficence, and justice as set forth in the Belmont Report.
Minimal risk: Federal regulations define this to mean that the risks of harm anticipated in the proposed research are not greater, considering probability and magnitude, than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.
Survey for Mathematics 110

Mathematics 110 instructor ____________________________

The last 4 digits of your student identification number (this maintains anonymity because the researcher nor your instructor will be able to identify you this way) ____________

What are the last 3 mathematics courses you have taken?

3 courses ago - course ________________ grade __________
where taken ________________________________

Comments you want to make about your experience in this course
________________________________________________________________________

2 courses ago - course ________________ grade __________
where taken ________________________________

Comments you want to make about your experience in this course
________________________________________________________________________

Last course taken ________________ grade __________
where taken _______________________________________

Comments you want to make about your experience in this course
________________________________________________________________________

Your age ______ male____ female____
Racial/Ethnic identity _________________________________
Disabilities yes____ no____
Explain ____________________________________________

Hours spent working each week ____________
Number of units you are enrolled in this semester ______
Major, or desired major _____________________________
Are you a first-year student____ second-year____ or other ________

On a scale from 1 to 10 please circle the number correlating to your answer

I enjoy mathematics

1  2  3  4  5  6  7  8  9  10
not at all it's okay a lot
I think I am good at mathematics

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>not at all</td>
<td>it's okay</td>
<td>a lot</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What I like most about mathematics

________________________________________________________________________

What I like most about mathematics classes

________________________________________________________________________

I think mathematics is fun. True_____ False_____
What I like least about mathematics

________________________________________________________________________

What I like least about mathematics classes

________________________________________________________________________

What helps me succeed in math

________________________________________________________________________

What prevents me from succeeding in math

________________________________________________________________________

I plan to take more mathematics courses in the future. Yes_____ No_____. If yes, the next course I plan to take is ____________________________.

I think mathematics benefits me in the following way(s)

________________________________________________________________________

________________________________________________________________________

Math makes me feel anxious. Yes_____ No_____ Don't Know_______
If yes why does math make you feel anxious?

________________________________________________________________________

________________________________________________________________________
I am good at mathematics in the following ways

________________________________________________________________________

I am good in mathematics classes in the following ways

________________________________________________________________________

I struggle with mathematics in the following ways

________________________________________________________________________

________________________________________________________________________

I struggle in mathematics classes in the following ways

________________________________________________________________________

________________________________________________________________________

Where I get stuck in mathematics class is

________________________________________________________________________

How I go about solving mathematics problems is

________________________________________________________________________

________________________________________________________________________

Other comments you would like to make

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________