

# Amy G. Froelich

## Education

- Ph.D. in Statistics** 10/00  
University of Illinois at Urbana-Champaign  
Advisor: William F. Stout  
Thesis Title: *Assessing Unidimensionality of Test Items  
and Some Asymptotics of Parametric Item Response Theory*
- B.S. in Secondary Mathematics Education** 5/94  
University of Illinois at Urbana-Champaign  
Highest University Honors - Bronze Tablet

## Professional Employment

- Associate Professor** 8/08 - present  
Department of Statistics, Iowa State University
- Faculty Member** 8/06 - present  
Master of School Mathematics Program  
Department of Mathematics, Iowa State University
- Assistant Professor** 8/00 - 8/08  
Department of Statistics, Iowa State University
- Graduate Research Assistant** 8/97 - 7/00  
Statistical Laboratory for Psychological and Educational Measurement  
Department of Statistics, University of Illinois at Urbana-Champaign
- Graduate Teaching Assistant** 8/95 - 8/97  
Department of Statistics, University of Illinois at Urbana-Champaign
- Mathematics Instructor** 8/94 - 8/95  
United Township High School, East Moline, Illinois

## Society Memberships

- American Statistical Association  
National Council on Measurement in Education  
Psychometric Society

## Research Interests

- Statistics Education, Psychometrics, Educational Measurement

## Honors and Awards

<b>Faculty Learning Community for Large Class Enhancement Award</b> Center for Excellence in Learning and Teaching and College of Liberal Arts and Sciences, Iowa State University	2007-2008
<b>Miller Scholarship of Teaching and Learning Institute Award</b> Center for Excellence in Learning and Teaching, Iowa State University	2007-2008
<b>ISU Foundation Award for Early Achievement in Teaching</b> Iowa State University	Fall 2004
<b>Maurice Tatsouka Award Scholar</b> College of Education, University of Illinois at Urbana-Champaign	Fall 1999
<b>Incomplete List of Teachers Ranked as Excellent by Their Students</b> University of Illinois at Urbana-Champaign	Fall 1996

## Teaching

### Iowa State University (2000-2008)

Typical (average) teaching load is four courses per year (34 courses total since 2000). Largely responsible for teaching several courses in the undergraduate program, including the introductory course for general majors and the two-course sequence in calculus-based probability and statistics for statistics and mathematics majors.

Total number of students since 2000: 1,141

Average Student Credit Hours per year since 2000: 497.63

Course	Title (Credit Hours)	Total Enrollment	Number of Times Taught
Stat 100	Orientation in Statistics (R)	42	5
Stat 101	Principles of Statistics (4)	549	6
Stat 101L	Principles of Statistics, Special Section (4)	64	3
Stat 341	Introduction to the Theory of Probability and Statistics I (3)	268	7
Stat 342	Introduction to the Theory of Probability and Statistics II (3)	158	7
Stat 401	Statistical Methods for Research Workers (4)	50	1
Stat 490H	Independent Study (3)	1	1
Stat 590B	Special Topics (Methods) (3)	1	1
Stat 599	Creative Component (4)	1	1
Stat 699	Research (3)	2	2
Math 397X	Teaching Secondary Mathematics Using University Mathematics (2 week module) (3)	8	1

### University of Illinois at Urbana-Champaign (1995 - 1997)

Discussion section teaching assistant for first semester of calculus-based probability and statistics course sequence (Statistics 310) during first year. Solely responsible for instruction in a section of the introductory course in statistics for general majors (Statistics 100) during second year.

## Course Coordination

Responsible for instruction in all sections of Statistics 101 at Iowa State University. Typically five lecture sections per semester, with 500 total students, five course instructors and 10 laboratory teaching assistants. Duties include choosing the course textbook, setting the course syllabus, writing all homework and laboratory assignments and solutions, maintaining course website, supervising and mentoring all course instructors, supervising and mentoring all laboratory instructors, providing all disability accommodations, approving course grades for all sections.

Course Coordinator for ten semesters from 2000-2008.

Total number of students from 2000-2008: 4,956

Additional total student credit hours (due to coordination alone): 17,628.

## Advising

Responsible for advising undergraduate and graduate statistics majors in the department. A large portion of this responsibility is advising undergraduate statistics majors. Duties include a minimum of two advising meetings per year with each advisee, maintenance of each advisee's degree audit, assisting advisees in meeting career or graduate school goals, and writing letters of recommendation for advisees. Current number of majors in the undergraduate statistics program at is 44, growing steadily from 20 since 2000.

Duties for advising graduate students include working with students to identify topics for master's creative component or doctoral dissertation, developing and approving the student's program of study, and supervising the completion of the master's creative component or doctoral dissertation.

## Undergraduate

2007-2008	20 advisees
Total since 2000	43 advisees

## Senior Honors Project

Jessica Culhane	B.S. Statistics & Economics	May 2007
<i>What are the odds? A study of randomness and the iPod</i>		

## Master of Science

Kira Barclay Sisson	Statistics	August 2005
<i>Credit scorecard development using Model Builder for predictive analytics</i>		
Robert Dengler	School Mathematics	Exp. August 2008
<i>Assessment of course outcomes in Pre-Algebra</i>		

## Ph.D.

Ellis Ott	Ph.D. Co-Major (Statistics & Education) (Co-Major Professor: Gary Phye)	December 2007
<i>Statistical issues with No Child Left Behind</i>		

## **Mentoring**

Responsible for mentoring graduate student teaching assistants serving as course instructors for Statistics 101 in the department. Mentoring activities include weekly meetings throughout the semester to discuss strategies for management of large classes, pedagogy for teaching topics in the course, and course scheduling timelines. At least once per academic year, each graduate student receives feedback on teaching performance through a combination of a minimum of one classroom visit and examination of course materials.

Mentored two undergraduate statistics majors for the first actuarial examination in Probability. Mentoring activities included weekly meetings and guidance on study materials for examination. Both students successfully completed the examination in the first attempt after mentoring.

## **Preparing Future Faculty**

Melissa Bingham                      Fall 2007

## **Teaching**

Julie Hanson                              Spring 2001  
Brooke Fridley                            Spring 2001, Fall 2001  
Rhonda DeCook                         Spring 2001, Fall 2001  
Michael Eraas                             Spring 2001, Fall 2001, Fall 2002, Spring 2003  
Luke Willis                                Fall 2002, Spring 2003  
Huiyan Zhao                              Fall 2002, Spring 2003  
Samantha Montgomery                 Fall 2002, Spring 2003  
Tammy Brown                             Spring 2003, Fall 2003, Spring 2004  
Myra Young                                Fall 2003, Spring 2004  
Emile White                                Fall 2003, Spring 2004  
Jennifer Hockett                         Fall 2003, Spring 2004  
Jude Burger                                Spring 2004  
Patrick Macke                             Spring 2004, Fall 2004, Spring 2005  
Jessica Chapman                         Fall 2004, Spring 2005, Spring 2008  
Kira Barclay Sisson                      Fall 2004, Spring 2005  
Paul Buzinec                                Spring 2005  
Timothy Bancroft                         Spring 2005  
Kyle Hewitt                                 Fall 2007, Spring 2008  
Karl Pazdernik                            Fall 2007, Spring 2008  
Reka Howard                                Fall 2007  
Trang Le                                     Spring 2008  
Jeremy Craft                                Spring 2008

## **Actuarial Science Exams**

Megan Brown                              Spring 2005  
Elizabeth Brei                              Fall 2002

## Program of Study Committees

### In Progress

- 1 M.S. Inside Department Committee Member
- 2 Ph.D. Outside Department Committee Member

### Completed

- 1 M.S., 1 Ph.D. Outside Department Committee Member
- 1 Ph.D. Departmental Committee Member

## Scholarship

### Refereed Publications

- Froelich, A.G.**, Duckworth, W.M. & Stephenson, W.R. (2005). Training Statistics Teachers at Iowa State University, *The American Statistician*, Vol. 59, No. 1. (pp. 8-10).
- Froelich, A.G.** & Habing, B. (2008). Conditional covariance based subtest selection for DIMTEST. *Applied Psychological Measurement*, Vol. 32, No. 2. (pp. 138-155).
- Froelich, A.G.**, Kliemann, W. & Thompson, H. (2008). Changing the statistics curriculum for future and current high school mathematics teachers: a case study. *International Commission on Mathematical Instruction (ICMI) and the International Association for Statistical Education (IASE) Joint Study on Statistics Education in School Mathematics: Challenges for Teaching and Teacher Education*. Proceedings of the ICMI Study 18 Conference and IASE 2008 Round Table Conference. Available on web at [http://www.ugr.es/~icmi/iase\\_study/Files/Topic6/T6P5\\_Froelich.pdf](http://www.ugr.es/~icmi/iase_study/Files/Topic6/T6P5_Froelich.pdf).
- Froelich, A.G.**, Stephenson, W.R. & Duckworth, W.M. (2008). Assessment of materials for engaging students in statistical discovery. *Journal of Statistics Education*, Vol. 16, No. 2. Available on web at <http://www.amstat.org/publications/jse/v16n2/froelich.html>.
- Froelich, A.G.**, Duckworth, W.M. & Culhane, J. Does your iPod *really* play favorites? Accepted for publication with minor revisions to the *The American Statistician*. (pp. 1-13).
- Froelich, A.G.** & Stephenson, W.R. How much does an M&M weigh? Submitted for publication to *The American Statistician*. (pp. 1-16).
- Stephenson, W.R., **Froelich, A.G.** & Duckworth, W.M. Resampling, with and without replacement. Submitted for publication to the journal *Teaching Statistics*. (pp. 1-10).

### Invited Book Chapters

- Froelich, A.G.** *Methods from Item Response Theory: Going Beyond Traditional Validity and Reliability in Standardizing Assessments*. In Shelly, M., Yore, L. & Hand, B. (Eds) Quality Research in Literacy and Science Education: International Perspectives and Gold Standards. Springer. (Forthcoming in 2008).
- Stout, W., **Froelich, A.G.**, & Gao, F. (2001). *Using resampling to produce an improved DIMTEST procedure*. In Boomsma, A., van Duijn, M.A.J. & Snijders, T.A.B. (Eds.) Essays on Item Response Theory. (pp. 357-376). New York: Springer-Verlag.

## Technical Reports

- Froelich, A.G.**, Stout, W., & Ackerman, T. (2006) *Modifying Existing Dimensionality Assessment Tools for Use in a CAT Environment*. Law School Admission Council Research Report Series, Law School Admission Council Computerized Testing Report 99-10. Available on web at <http://www.lsacnet.org/Research/Modifying-Existing-Dimensionality-Assessment-tools-in-CAT-Environment.htm>. (pp. 1-23).
- Alaimo, K. & **Froelich, A.G.** (2004) *Alternative construction of a Food Insecurity and Hunger Measure from the 1995 Current Population Survey Food Security Supplement Data*. Measuring Food Insecurity and Hunger: Phase 1 Report, Workshop on the Measurement of Food Insecurity and Hunger. Available on web at [http://www7.nationalacademies.org/cnstat/Alternative\\_Construction\\_of\\_Food\\_Security\\_Paper.pdf](http://www7.nationalacademies.org/cnstat/Alternative_Construction_of_Food_Security_Paper.pdf). (pp. 1-31).
- Stout, W., Bolt, D., **Froelich, A.G.**, Habing, B., Hartz, S., Roussos, L. (2003) *Development of a SIBTEST Bundle Methodology for Improving Test Equity with Applications for GRE Test Development*. Graduate Record Exam Board Report No. 98-15P, Educational Testing Service Report 03-06. Available on web at <http://www.ets.org/Media/Research/pdf/RR-03-06-Stout.pdf>. (pp. 1-84).

## Proceedings

- Froelich, A.G.** & Duckworth, W.M. *Using JMP scripts in teaching introductory statistics*, American Statistical Association Proceedings of the Section on Statistical Education, (2007) in press. (pp. 1-5)
- Froelich, A.G.**, Stephenson, W.R. & Duckworth, W.M. *Further assessment of materials for engaging students in statistical discovery*, American Statistical Association Proceedings of the Section on Statistical Education, (2006). (pp. 2287-2294).
- Froelich, A.G.**, Stephenson, W.R. & Duckworth, W.M. *Assessment of materials for engaging students in statistical discovery*, American Statistical Association Proceedings of the Section on Statistical Education, (2005). (pp. 2223-2230).
- Froelich, A.G.**, Stephenson, W.R. & Duckworth, W.M. *Engaging students in statistical discovery*, American Statistical Association Proceedings of the Section on Statistical Education, (2004). (pp. 2660-2662).

## Software

- DIMPACK - Nonparametric Dimensionality Analysis Package - Fortran programs for non-parametric dimensionality assessment, connected through Visual Basic front end in Windows. 50% responsible for programming, testing and documentation of Visual Basic front end. Package includes DIMTEST 2. Available since 2007 through Assessment Systems Corporation, <http://www.assess.com>.
- DIMTEST 2 - Fortran program based on dissertation and subsequent work on the second generation of DIMTEST program. 95% responsible for programming, testing and documentation. Available from 2003 - 2007 through Assessment Systems Corporation, <http://www.assess.com>.
- DIFPACK - Dimensionality-Based DIF Analysis Package - Fortran programs for Differential Item Functioning/Differential Test Functioning (DIF/DTF) detection, connected through Visual Basic front end in Windows. 75% responsible for programming, testing,

and documentation of Visual Basic front end. Available since 1999 through Assessment Systems Corporation, <http://www.assess.com>.

### **Manuscripts In Preparation**

**Froelich, A.G.** Using R to teach probability and mathematical statistics. To be submitted to the journal *Technology Innovations in Statistics Education*.

Nettleton, D. & **Froelich, A.G.** Does my baby really look like me? Testing for resemblance between parent and child. To be submitted to *The American Statistician*.

**Froelich, A.G.** A new bias correction method for the DIMTEST procedure. Being revised for resubmission to the journal *Psychometrika*.

**Froelich, A.G.** Assessing the dimensionality of polytomous test items: Poly-DIMTEST. To be submitted to the *Journal of Educational and Behavioral Statistics*.

**Froelich, A.G.** & Jensen, H. Dimensionality of the USDA Food Security Index. To be submitted to the *Journal of Nutrition*.

### **Scholarship of Teaching and Learning - Teaching Materials**

Currently developing a repository for statistics education materials developed by faculty at Iowa State University. The repository is located on the web at <http://stated.stat.iastate.edu>. My personal contributions to this repository are listed below.

**Activities for Engaging Students in Statistical Discovery**

**JMP Scripts for Teaching Introductory Statistics**

**Lecture Notes for Statistics 101**

**Lab Activities for Statistics 101**

**Web Resources for Teaching Probability and Mathematical Statistics**

**R Resources for Teaching Probability and Mathematical Statistics**

### **Scholarship of Teaching and Learning - Departmental Teaching Documents**

#### **Guidelines for Teaching Introductory Courses in the Department of Statistics**

This document was written primarily to serve as a resource for new graduate student course instructors in the department. However, faculty teaching courses at all levels also use this as a resource for their teaching. The document is updated at least once a year to reflect changes in University and Departmental policies, changes in personnel, and to incorporate special issues that arose since the last revision.

#### **Manual for Teaching Assistants in the Department of Statistics**

This document was written to communicate the responsibilities and duties of graders and laboratory assistants to graduate student teaching assistants in the department. The document is updated at least once a year to reflect changes in University and Departmental policies and to incorporate special issues that arose since the last revision.

## Scholarship of Teaching and Learning - Curriculum and Course Development

### **Statistics 101**

Developed 7 (out of 11 total) new laboratory exercises for course. All students in Statistics 101 complete one lab exercise in the two-hour laboratory session during most weeks of the semester. All new labs are still in use in the course and have been revised and edited by other course coordinators.

### **Statistics 101L**

Developed jointly with Professor W. Robert Stephenson a new section of the introductory course (non-calculus based) for students with strong mathematics backgrounds as evidenced by their ACT Math or SAT Math scores. This new section has been offered each Spring semester since 2003 and is open to all majors on campus. Enrollment is targeted towards freshmen and sophomores majors both in the mathematical sciences and in majors that require Statistics 101 for graduation. Although this course covers much of the same content as the regular introductory course, almost all other aspects (syllabus, laboratory assignments, homework assignments, etc.) of this section are different than the regular sections of the course.

### **Statistics 341 and 342**

Developing new course materials incorporating ideas from the reform movement in statistical education at the introductory course level into the traditional two-semester probability and mathematical statistics course sequence. The new materials are structured around the use of the statistical software package R.

### **Statistics for Pre-Service Secondary Mathematics Teachers**

To support the National Council of Teachers of Mathematics (NCTM) 2001 *Principles and Standards for School Mathematics*, the American Statistical Association 2005 *Guidelines for Assessment and Instruction in Statistics Education (GAISE)*, and the new Model Core Curricula for Mathematics in the State of Iowa, a proposal from the Department of Statistics for curriculum changes in statistics for the Bachelor of Science Degree in Mathematics with Licensure to Teach 7-12 Mathematics in the State of Iowa has been approved by the Department of Mathematics. The proposal increases the number of courses in statistics and probability required for the degree from one to two, without a third statistics course highly recommended. The three courses include the introductory course in statistics for students with strong mathematics backgrounds (Statistics 101L), and a calculus-based introduction to probability and mathematical statistics (Statistics 341 and 342).

### **Statistics for Master of School Mathematics Program**

Currently developing and teaching for the first time a new 6-credit hour graduate level course in Statistics for the Master of School Mathematics Program in Summer 2008. This course (Stat 410X) includes topics from several courses at the 400-level in the Department, including mathematical statistics, univariate, bivariate and multivariate statistical methods, survey sampling and design of experiments. Course will incorporate materials and pedagogy appropriate for teachers of AP Statistics, high school teachers teaching a dual-credit introductory statistics course for the community college, or community college teachers of statistics.

## Invited Presentations

- Visions for the Future of Mathematics Education in Iowa.* (with Ken Koehler). Meeting of the Chief Academic Officers and Deans of Arts and Sciences from the state's 15 community colleges, Des Moines Area Community College, Ankeny, Iowa, November, 2007.
- Statistics Education in the State of Iowa, Grades 9 - 16: Current Status and Implications for the Future.* Iowa Mathematics Association of Two-Year Colleges, Fall 2007 meeting, Iowa Central Community College, Fort Dodge, Iowa, October, 2007.
- Using R in Undergraduate Probability and Mathematical Statistics Courses.* Invited seminar, Department of Statistics, Iowa State University, Ames, Iowa, September 2007.
- Teaching Problem-solving Transfer in High School Mathematics: Algebra I and Geometry.* Professional Development Meetings for Enhancing Education Through Technology (E2T2) Co-hort 4, Area Education Agency 11 (Heartland AEA), Des Moines, Iowa, September 5 and 6, 2007.
- Using R in Undergraduate and Graduate Courses in Probability and Mathematical Statistics.* Co-Chair and Presenter for Invited Session on Teaching and R at the UseR! conference, Ames, Iowa, August 2007.
- How much does a single M&M weigh? Activities for engaging students in statistical discovery.* (with W. Robert Stephenson). Invited Breakout Session at the United States Conference on Teaching Statistics (USCOTS), The Ohio State University, Columbus, Ohio, May 2007.
- Preliminary Results of the Survey of Attitudes Toward Statistics in introductory statistics courses at Iowa State University.* Invited seminar sponsored by a TEACH grant from the Center for Excellence in Learning and Teaching, Iowa State University, Ames, Iowa, April 2007.
- Multidimensional Item Response Theory.* (with Brian Habing). Invited All-Day Workshop at the annual meeting of the National Council on Measurement in Education, Chicago, Illinois, April 2007.
- Teaching developments in the Department of Statistics.* (with Michael D. Larsen and C. Ted Peterson). Invited seminar, Department of Statistics, Iowa State University, Ames, Iowa, December 2006.
- Materials for and assessment of engaging students in statistical discovery.* Invited seminar, Department of Statistics and Actuarial Science, University of Iowa, Iowa City, Iowa, September 2006.
- Training statistics teachers at Iowa State University.* Invited panelist at the annual Joint Statistical Meetings, Seattle, Washington, August 2006.
- Multidimensional Item Response Theory.* (with Brian Habing). Invited All-Day Workshop at the annual meeting of the National Council on Measurement in Education, Montreal, Canada, April 2005.
- Do the obvious, tips for teaching.* Invited presentation, Faculty Forum sponsored by the Center for Excellence in Learning and Teaching, Iowa State University, Ames, September 2004.
- Alternative construction of a food insecurity and hunger measure from the 1995 Current Population Survey Food Security Supplement Data.* (with Katherine Alaimo). Invited

Paper presented at the Workshop on the Measurement of Food Insecurity and Hunger. Sponsored by the Panel to Review USDA's Measurement of Food Insecurity and Hunger, Committee on National Statistics, The National Academies, Washington, D.C. July 2004.

*Refinements of the DIMTEST methodology for testing unidimensionality and local independence.* Invited Paper presented at the annual conference of the National Council on Measurement in Education, Seattle, WA, April 2001.

## Contributed Presentations

*Tips in Ten: An Example of Using a Tablet PC with PowerPoint Slides.* Presentation made to the Faculty Learning Community for Large Class Enhancement, Center for Excellence in Learning and Teaching, Iowa State University, October 2007.

*Using JMP Scripts in Teaching Introductory Statistics.* Poster presented at the annual Joint Statistical Meetings, Salt Lake City, Utah, July 2007.

*Further assessment of material for engaging students in statistical discovery.* Paper presented by W. Robert Stephenson at the annual Joint Statistical Meetings, Seattle, Washington, August 2006.

*Further assessment of material for engaging students in statistical discovery.* Poster presented by W. Robert Stephenson at the International Conference on Teaching Statistics (ICOTS), Salvador, Brazil, July 2006.

*Assessment of materials for engaging students in statistical discovery.* Paper presented at the annual Joint Statistical Meetings, Minneapolis, Minnesota, August 2005.

*Using hands-on methods with computer simulations to teach sampling distributions and inference.* Poster presented at the United States Conference on Teaching Statistics (USCOTS), The Ohio State University, Columbus, Ohio, May 2005.

*Engaging students in statistical discovery.* Poster presented at the annual Joint Mathematics Meetings, Atlanta, Georgia, January 2005.

*Engaging students in statistical discovery.* Poster presented at the annual Joint Statistical Meetings, Toronto, Canada, August 2004.

*A study of methods for selecting the AT Subtest in the DIMTEST procedure.* Presented at the annual meeting of the Psychometric Society, University of North Carolina, Chapel-Hill, June 2002.

*Assessing the unidimensionality of CAT Items: CAT-DIMTEST.* Paper presented at the annual meeting of Psychometrics Society, June 24-27, 1999.

## Funding

### Funded

**Froelich, A.G.**, Genschel, U. & Stephenson, W.R. *Formative Assessments to Aid in Statistical Thinking, Literacy and Practice in Introductory Statistics*, Miller Faculty Fellowship, Iowa State University, (\$23,743). July 1, 2008 to June 30, 2009.

Jensen, H.H. & **Froelich, A.G.** *Exploring Technical Enhancements to Improve Food Security Measurement*, Economic Research Service Cooperative Agreement, United States Department of Agriculture, (\$65,000). Funded from October 1, 2007 to September 30, 2009.

Phye, G.D. & **Froelich, A.G.** *Teaching and Assessment of Problem-solving Transfer in High School Mathematics*, Roy J. Carver Charitable Trust, (\$338,460). Funded from July 1, 2006 to June 30, 2009.

Kliemann, W. & **Froelich, A.G.** *Iowa High School - College Information System for Mathematics and Statistics*, College of Liberal Arts & Sciences, (\$32,000). Funded from July 1, 2007 to June 30, 2008.

**Froelich, A.G.** & Larsen, M. *Examining student attitudes towards statistics in the introductory classes*, TEACH Grant, Center for Excellence in Learning and Teaching (CELT), Iowa State University, (\$1,500). Funded from January 1, 2007 to June 30, 2007.

Larsen, M. & **Froelich, A.G.** *Computer Instructional Material for Probability and Mathematical Statistics*, College of Liberal Arts & Sciences Computer Advisory Committee, (\$6,111). Funded from January 1, 2006 to June 30, 2006.

Stephenson, W.R., **Froelich, A.G.** & Duckworth, W.M. *Conceptual Statistics: Engaging Students in Statistical Discovery*, National Science Foundation, Course, Curriculum and Laboratory Improvement Program (\$74,976). Funded from May 15, 2003 to June 30, 2005.

Duckworth, W.M., **Froelich, A.G.** & Stephenson, W.R. *Engaging Students in Statistical Discovery*, Miller Faculty Fellowship, Iowa State University, (\$20,300). Funded from July 1, 2002 to June 30, 2003.

Applications Pending

Foegen, A. & **Froelich, A.G.** *Algebra Screening and Progress Monitoring*, Institute of Educational Sciences, National Center for Special Education Research, U. S. Department of Education, (\$1,600,000). July 2008.

## Current Projects

### **Teaching and Assessment of Problem-solving Transfer in High School Mathematics**

Currently developing, with Dr. Gary Phye, Department of Curriculum and Instruction, College of Human Sciences, materials for use in the high school mathematics classroom to improve the problem solving transfer of students. During the 2007-2008 school year, materials developed for Algebra I and Geometry will be field tested in 20 high schools in central Iowa. During the 2008-2009 school year, these materials plus materials for Algebra II will be field tested in additional high schools (precise number yet to be determined) in central Iowa. Responsibilities include development of materials for Algebra I and Algebra II and overseeing materials development for Geometry, designing professional development meetings with high school teachers on the use of the materials, and assessment of the effectiveness of the materials in improving problem solving transfer of students.

### **Analysis of the Survey of Attitudes Toward Statistics (SATS)**

Currently studying, in collaboration with its developer Dr. Candace Schau, Professor Emeritus, University of New Mexico, the psychometric properties of the Survey of Attitudes Toward Statistics (SATS). Survey data is being collected from all students enrolled in a selection of introductory statistics courses at Iowa State University. These data and others collected from other colleges and universities throughout the country will be used

to further assess the properties of the SATS using methodology from Item Response Theory.

### **Iowa High School - College Information System for Mathematics and Statistics**

Currently in charge of developing, as a part of the Iowa Initiative for College Mathematics and Statistics Education (IICMASE), an information sharing system about student performance in mathematics and statistics at Iowa State University. This pilot project involves the creation of a database designed to provide reports to high school faculty and community college faculty about the performance of their students at ISU, provide information to faculty at ISU to assist in academic advising, and to determine significant variables that are related to ultimate student success in obtaining a bachelor's degree in a STEM related field, or in any field. The goal is to extend this pilot project to the University of Iowa and the University of Northern Iowa in the next one to two years.

### **Using JMP Scripts in Teaching Introductory Statistics**

Invited by Curt Hinrichs, Manager for JMP Academic Programs, to develop and revise existing JMP scripts to aid in teaching concepts in introductory statistics. In collaboration with Dr. William M. Duckworth, Creighton University, we plan to assist the team from JMP in the selection of topics, presentation of the JMP scripts, and related activities and lessons for each script.

### **Assessment of Materials for Sampling Distributions and Inference**

Currently planning assessment project for materials developed during a previous NSF funded project. In collaboration with Dr. William M. Duckworth, Creighton University, we plan to assess the effectiveness of these materials during the 2007-2008 academic year in improving student understanding and learning on concepts in the introductory statistics course for general majors.

## **Professional Practice and Consulting**

### **Consulting**

#### **Psychology in Education Research Laboratory (PERL), Department of Curriculum and Instruction, College of Human Sciences, 2005 to present.**

Consulted with Dr. Gary Phye and the staff at PERL on several projects, including "Enhancing Education Through Technology" and "Evaluating State Educational Technology Programs." Activities include using statistical/psychometric expertise to assist with choosing the best methods and statistical analyses to solve a variety of research problems.

#### **The National Association of Industrial Technology Certification Examination, Department of Industrial Education and Technology, College of Education, 2001-2003.**

Consulted with Dr. Dennis Field and graduate student Douglas McCue on the assessment of the National Association of Industrial Technology (NAIT) certification examination. Activities included training on methodology from both Item Response Theory and Classical Test Theory, training on the use of appropriate software in these areas, and assisting with the interpretation of results.

#### **Improving Measurement of Food Security and Hunger, Departments of Statistics and Economics, College of Liberal Arts and Sciences, 2001-2002.**

Consulted with Dr. Sarah Nusser and Dr. Jean Opsomer from Statistics and with Dr. Helen Jensen from Economics on the assessment of the current USDA Food

Security and Hunger Index. Activities included analysis of existing project data using methodology from Item Response Theory and communication of results through meetings and a final project report.

### **Professional Practice**

Article reviewer for *International Commission on Mathematical Instruction (ICMI) and the International Association for Statistical Education (IASE) Joint Study on Statistics Education in School Mathematics: Challenges for Teaching and Teacher Education*

Article reviewer for *The American Statistician*

Article reviewer for *Journal of Statistics Education*

Article reviewer for *Journal of the First-Year Experience and Students in Transition*

### **Service to Iowa State University**

#### **Department**

Faculty Advisor for STAT-ers (statistics graduate student group), 2001-2003

Library Committee, 2002-2003

Departmental Program Outcomes and Assessment Semester Workshop, Fall 2003

Strategic Planning Committee, 2004-2006

Curriculum Committee, 2006-2008

Student-Faculty Committee on Instruction, 2000-2008 (Co-Chair 2001-2008)

Undergraduate Committee, 2000-2008 (Chair 2007-2008)

#### **College**

LAS Undergraduate Advising Coordinator, 2006 to present

Dean's Committee on Improving Calculus Instruction at Iowa State University, 2006-2007

#### **University**

Mathematics Placement Examination Committee, 2006-2007

Departmental Representative to the Iowa Initiative for College Mathematics and Statistics Education (IICMASE), 2006 to present

Representative to the Math Transitions Congress, sponsored by the Board of Regents, State of Iowa, at the University of Northern Iowa, November 2007