Amy G. Froelich

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Education

Ph.D. – Statistics October 2000
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. – Secondary Mathematics Education May 1994
University of Illinois at Urbana - Champaign
Highest University Honors - Bronze Tablet

Professional Employment

Iowa State University

Director of Undergraduate Education	January 2018 – present
Associate Professor of Statistics	August 2008 – present
Faculty - Master of School Mathematics Program	August 2006 – December 2019
Assistant Professor of Statistics	August 2000 – August 2008

University of Illinois, Urbana - Champaign

Graduate Research Assistant - Statistical Laboratory for Psychological and Educational Measurement	August 1997 – July 2000
Graduate Teaching Assistant - Department of Statistics	August 1995 – August 1997

United Township High School, East Moline, Illinois August 1994 – August 1995
Mathematics Instructor

Society Memberships

American Statistical Association

Research Interests

Statistics Education, Psychometrics, Educational Measurement

Honors and Awards

Excellence in Introductory Teaching Award 2015
College of Liberal Arts and Sciences, Iowa State University

Waller Award for Innovation in the Instruction of Elementary Statistics 2010
American Statistical Association

Faculty Professional Development Assignment Fall 2009
College of Liberal Arts and Sciences, Iowa State University

Ruth W. Swenson Award for Outstanding Advising 2009
College of Liberal Arts and Sciences, Iowa State University

Faculty Learning Community for Large Class Enhancement Award 2007-2008
Center for Excellence in Learning and Teaching and College of Liberal Arts and Sciences, Iowa State University

Miller Scholarship of Teaching and Learning Institute Award 2007-2008
Center for Excellence in Learning and Teaching, Iowa State University

ISU Foundation Award for Early Achievement in Teaching 2004
Iowa State University

Maurice Tatsouka Award Scholar 1999
College of Education, University of Illinois at Urbana - Champaign

Incomplete List of Teachers Ranked as Excellent by Their Students Fall 1996
University of Illinois at Urbana - Champaign

Teaching

Iowa State University (2000-2018)

Typical teaching load has varied from two to four courses per year. Teaching assignments are generally focused in the undergraduate program.

Total Course Enrollments: 2,821
Total Student Credit Hours: 9,896

Courses Taught and Enrollments

Course	Title (Credit Hours)	Total Enrollment	Number of Times Taught
STAT 100	Orientation in Statistics (R)	121	8
STAT 101	Principles of Statistics (4)	1162	12
STAT 101L	Principles of Statistics, Special Section (4)	64	3
STAT 201	Intro. to Stat. Concepts and Methods (4)	42	1
STAT 226	Introduction to Business Statistics I (3)	85	1
STAT 301	Intermediate Statistical Concepts and Methods	40	1
STAT 341	Introduction to the Theory of Probability and Statistics I (3)	366	9
STAT 342	Introduction to the Theory of Probability and Statistics II (3)	285	10
STAT 401	Statistical Methods for Research Workers (4)	50	1
STAT 404	Regression for Social and Behavioral Research (3)	45	1
STAT 410	Statistical Methods for Mathematics Teachers (6)	69	4
STAT 447	Statistical Theory for Research Workers (4)	41	2
STAT 457	Applied Categorical Data Analysis (3)	178	6

STAT 490	Independent Study (1)	1	2
STAT 490H	Independent Study (Honors) (3)	1	1
STAT 500	Statistical Methods I (4)	182	3
STAT 528	Applied Business Statistics (3)	30	1
STAT 559X	Item Response Theory (3)	26	3
STAT 590 B	Special Topics (Methods) (var.)	2	2
STAT 590 E	Special Topics (Statistics Education) (var.)	1	1
STAT 599	Creative Component (var.)	11	9
STAT 699	Research (3)	2	2
MATH 397X	Teaching Secondary Mathematics Using University Mathematics (2 week module) (3)	8	1
MATH 599	Creative Component (var.)	7	7

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

Discussion section teaching assistant for first semester of calculus-based probability and statistics course sequence. Solely responsible for instruction in a section of the introductory course in statistics for general majors.

Course Coordination

Responsible for instruction in all sections of either Statistics 101 (primarily) or Statistics 226 at Iowa State University. Stat 101 typically has five to six lecture sections per semester, with 500 - 600 total students, five to six course instructors and 10 - 12 laboratory teaching assistants. Stat 226 typically has seven lecture sections per semester, with 550 total students, seven course instructors and seven graders. Duties include choosing the course textbook, setting the course syllabus, writing all homework and laboratory assignments and solutions, developing and managing materials in course management system, supervising and mentoring all course instructors, supervising and mentoring all laboratory instructors, providing all disability accommodations, and approving course grades for all sections.

Course Coordinator for 25 semesters from 2000-2016.
Total Course Enrollments: 13,437
Additional Total Student Credit Hours (due to coordination alone): 47,746

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.

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

* Current: 40 advisees
* Total since 2000: 215 advisees

Undergraduate Senior Honors Project

* Jessica Culhane - Statistics & Economics — May 2007
  What are the odds? A study of randomness and the iPod

Master of School Mathematics

* Courtney Wahlstrom — December 2008
  Beta: A Statistical Analysis of a Stock's Volatility
* Robert Dengler — May 2009
  Research Based Decision Making in a Community College Setting
* Matthew Heston — August 2009
  An Analysis of APBA Baseball
* Cara Kern — December 2010
  Activities and Resources for the Advanced Placement Statistics Classroom
* Rachel Giesmann — August 2011
  Testing for Randomness: How to Prove What Should Happen When Anything Can Happen
* Karen Mason — August 2013
  Reading and Mathematics ITED Scores: Are They Related?
* Melissa Carlson — August 2013
  Statistical Applications of Auto Insurance

M.S. in Statistics

* Kira Barclay Sisson — August 2005
  Credit Scorecard Development using Model Builder for Predictive Analytics
* Nicole Rembert — May 2011
  Analysis of Assessment Structure in an Undergraduate Principles of Statistics Course
* Joshua Bernhard — August 2011
  Assessing the Effect of Clickers on Introductory Business Statistics Students' Understanding and Attitudes Towards Statistics
* Wilmina Siegfied — May 2012
  Assessing the Effect of Using Personal Glossaries for Vocabulary Acquisition in Introductory Statistics
* James Curro — August 2014
  A Study of Online Homework Feedback in Introductory Statistics

* Kathleen Rey December 2015
  A Case Study of Introductory Students' Understanding of Bar Graphs and Histograms
* Chelsey Legacy May 2017
  Developing a Shiny App for Teaching Basic Ideas of Statistical Inference
* Jonathan Lai May 2017
  Statistical Analysis of Actuarial Preparatory Exam Data
* He Jiang September 2018
  The Relationship between Vocabulary Knowledge and Conceptual Understanding in Introductory Statistics

Ph.D.

* Ellis Ott December 2007
  (Co-major with Statistics and Education (with Dr. Gary Phye))
  Statistical Issues with No Child Left Behind

Scholarship

Referred Journal Publications

* **Froelich, A.G.** & Stephenson, W.R. (2013). Does eye color depend on gender? It might depend on who or how you ask. *Journal of Statistics Education*, Vol. 21, No 2.
* **Froelich, A.G.** & Nettleton, D. (2013). Does my baby really look like me? Using tests for resemblance between parent and child to teach topics in categorical data analysis. *Journal of Statistics Education*, Vol. 21, No 2.
* **Froelich, A.G.** & Stephenson, W.R. (2013). How much do M&Ms weigh? *Teaching Statistics*, Vol. 35, No. 1. (pp. 14-20).
* Stephenson, W.R., **Froelich, A.G.** & Duckworth, W.M. (2010). Using resampling to compare two proportions. *Teaching Statistics*, Vol. 32, No. 5. (pp. 66-71).
* **Froelich, A.G.**, Duckworth, W.M. & Culhane, J. (2009). Does your iPod *really* play favorites? *The American Statistician*, Vol. 63, No. 3. (pp. 263-268).
* **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.
* **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.**, Duckworth, W.M. & Stephenson, W.R. (2005). Training Statistics Teachers at Iowa State University, *The American Statistician*, Vol. 59, No. 1. (pp. 8-10).

Refereed Conference Proceedings

* **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.

Book

* Bowerman, B.L., Drougas, A.M., Duckworth, W.M., **Froelich, A.G.**, Hummel, R.M., Moninger, K.B., Schur, P.J. (2019). Business Statistics and Analytics in Practice. Ninth Edition. New York, New York: McGraw-Hill.

Book Chapters

* **Froelich, A.G.** (2011). *Developing a statistics curriculum for future secondary mathematics teachers.* In Batanero, C., Burrill, G., & Reading, C. (Eds.), Teaching Statistics in School Mathematics - Challenges for Teaching and Teacher Education: A joint ICMI/IASE Study. (pp. 27-32). Springer.
* **Froelich, A.G.** (2009). *Methods from item response theory: going beyond traditional validity and reliability in standardizing assessments*. In M. C. Shelley II, L. D. Yore, & B. Hand (Eds.), Quality research in literacy and science education: International perspectives and gold standards. (pp. 287-301). Dordrecht, The Netherlands, Springer.
* 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.

Book Reviews

* Understanding Probability: Chance Rules in Everyday Life by Henk Tijms, *The American Statistician*, Vol. 64, No. 3. (pp. 274).

Technical Reports

* Foegen, A., Olson, J., Genareo, V., Dougherty, B., **Froelich, A**., Nashleanas, A., DeLeeuw, W., Karaman, R. (2017). *Algebra Screening and Progress Monitoring data: 2014-2015 (Technical Report 4).* Ames, IA: Iowa State University, School of Education, Algebra Screening and Progress Monitoring Project.
* Foegen, A., Olson, J., Genareo, V., Dougherty, B., **Froelich, A.**, Zhang, M., Nashleanas, A., DeLeeuw, W., & Karaman, R. (2017). *Algebra Screening and Progress Monitoring data: 2013-2014 (Technical Report 3)*. Ames, IA: Iowa State University, School of Education, Algebra Screening and Progress Monitoring Project.
* Genareo, V., Nashleanas, A., Olson, J., Foegen, A, Dougherty, B., DeLeeuw, W., **Froelich, A.**, Rice, K., & Karaman, R. (2017). *Algebra Screening and Progress Monitoring data: 2012-2013 (Technical Report 2)*. Ames, IA: Iowa State University, School of Education, Algebra Screening and Progress Monitoring Project.

* Genareo, V., Olson, J., Foegen, A, Dougherty, B., Spain, V., DeLeeuw, W., Nashleanas, A., **Froelich, A.**, & Rice, K. (2017). *Algebra Screening and Progress Monitoring data: 2011-2012 (Technical Report 1)*. Ames, IA: Iowa State University, School of Education, Algebra Screening and Progress Monitoring Project.
* **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.
* 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.
* 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.

Software

* JMP Concept Discovery Modules for Introductory Statistics – Available in JMP 13 and later and for download since 2009 through JMP Statistical Discovery Software, a business division of SAS Institute, Inc. jmp.com/academic/learning_modules.shtml.
* DIMPACK - Nonparametric Dimensionality Analysis Package - Fortran programs for nonparametric dimensionality assessment, connected through Visual Basic front end in Windows. Available since 2007.
* DIMTEST 2 - Fortran program based on dissertation and subsequent work on the second generation of DIMTEST program. Available from 2003 – 2007.
* 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. Available since 1999.

Proceedings

* **Froelich, A.G.** & Duckworth, W.M. *Using New JMP Interactive Modules to Teach Concepts in Introductory Statistics.* Proceedings of the 2010 SAS Global Forum Conference, Seattle, WA.
* **Froelich, A.G.** *Using JMP scripting language to teach sampling and inference for the proportion*, American Statistical Association Proceedings of the Section on Statistical Education, (2009). (pp. 5139-5144).
* **Froelich, A.G.** *Using R in undergraduate probability and mathematical statistics courses*, American Statistical Association Proceedings of the Section on Statistical Education, (2008). (pp. 2573-2580).
* **Froelich, A.G.** & Duckworth, W.M. *Using JMP scripts in teaching introductory statistics*, American Statistical Association Proceedings of the Section on Statistical Education, (2007). (pp. 2194-2198).
* **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).

Manuscripts in Preparation

* Marget, W. & **Froelich, A.G.** Testing the effectiveness of personal glossaries on vocabulary acquisition and conceptual understanding in introductory statistics. To be submitted to the *Statistics Education Research Journal*.
* **Froelich, A.G.** & Ziegler, L. Shower Your Students with Categorical Variables - A Multivariate Categorical Data Analysis. To be submitted to the *Journal of Statistics Education*.
* Rey, K. & **Froelich, A.G.** Comparing introductory statistics students' understanding of bar graphs and histograms. To be submitted to the *Journal of Statistics Education*.
* Rey, K., **Froelich, A.G.**, Kaplan, J., & Lyford, A.J. A comparative study of student understanding of center and variability in graphical displays. To be submitted to the *Statistics Education Research Journal*.
* Cheng, X., Cook, D., Rutter, L., & **Froelich, A.G.** ePort: Academic report generation for instructors of introductory statistics. To be submitted to the *Journal of Statistical Software*.
* Bernhard, J., **Froelich, A.G.** & Genschel, U. Assessing the effect of clickers on introductory business statistics students' understanding and attitudes towards statistics. To be submitted to the *Statistics Education Research Journal*.
* **Froelich, A.G.** Using R to teach probability and mathematical statistics. To be submitted to the journal *Technology Innovations in Statistics Education*.
* **Froelich, A.G.** Developing a statistics content curriculum for current secondary mathematics teachers. To be submitted to the *Journal of Statistics Education*.

Invited Presentations

* *Using Formative Assessment to Improve Student Learning in Large Enrollment Classes.* Invited breakout session with J. Kaplan and A. Lyford. United States Conference on Teaching Statistics, State College, Pennsylvania, May 2017.
* *Developing and Using Electronic Assessments to Inform Student Learning and Instruction in Introductory Statistics*. Invited seminar speaker, Department of Statistics, University of Georgia, March, 2016.
* *Developing and Using Electronic Assessments to Inform Instruction in Introductory Statistics*. Invited full-day workshop at the United States Conference on Teaching Statistics, State College, Pennsylvania, May 2015.
* *Using Personal Glossaries for Building Vocabulary in Introductory Statistics*. Invited poster presentation at the United States Conference on Teaching Statistics, Raleigh, North Carolina, May 2013.

* *Testing the Effectiveness of Clickers on Students Understanding and Attitudes in Introductory Business Statistics*. Invited seminar speaker, Department of Statistics, North Carolina State University, February, 2012.
* *Innovations in Statistics Education: Past, Present and a Glimpse at the Future*. Invited organizer and panelist at the annual Joint Statistical Meetings, Miami, Florida, August 2011.
* *Using the new JMP Concept Discovery Module for Regression to Build Conceptual Understanding in Introductory Statistics*. Invited breakout session presented by William M. Duckworth at the United States Conference on Teaching Statistics (USCOTS), North Carolina State University, Raleigh, NC, May 2011.
* *Using New JMP Interactive Modules to Teach Concepts in Introductory Statistics*. Invited poster presentation at the 2010 SAS Global Forum Conference, Seattle, WA, April 2010.
* *Using R in Undergraduate Probability and Mathematical Statistics Courses*. Invited alumni speaker at the 2010 University of Illinois at Urbana-Champaign Statistics Symposium, Champaign, IL, March 2010.
* *Using JMP Statistical Discovery Software for Building Conceptual Understanding in Introductory Statistics*. Invited Breakout Session at the United States Conference on Teaching Statistics (USCOTS), The Ohio State University, Columbus, Ohio, June 2009.
* *Using R to Teach Probability and Mathematical Statistics*. Chair and presenter for invited session at the Conference Celebrating 75 Years of Statistics at Iowa State University, Ames, Iowa, June 2009.
* *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, Monterrey, Mexico, June 2008.
* *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

* *Developing an Undergraduate Major in Data Science: A Statistics Educators Perspective.* Contributed Paper presented at the Joint Statistical Meetings, Denver, Colorado, August 2019.
* *Developing an Undergraduate Major in Data Science: A Statistician's Perspective.* Poster presented at the Women in Statistics and Data Science Conference, Cincinnati, Ohio, October 2018.
* *A Comparative Study of Student Understanding of Center and Variability in Graphical Displays*. with K. Rey, J. Kaplan and A. Lyford. Poster presented at the Joint Statistical Meetings, Baltimore, Maryland, August 2017.

* *Training In-Service High School Mathematics Teachers to Teach Introductory Statistics: A Case Study*. Invited poster presentation. Women in Statistics and Data Science Conference, October, 2016.
* *The Vocabulary Knowledge of Introductory Statistics Students and its Relationship to Conceptual Understanding*. Poster presented at the annual Joint Statistical Meetings, Chicago, Illinois, August 2016.
* *Using Electronic Assessments to Inform Student Learning in Introductory Statistics*. Poster presented at the annual Joint Statistical Meetings, Boston, Massachusetts, August 2014.
* *Designing a GAISE-Inspired Statistics Course for Current High School and Community College Mathematics Instructors*. Poster presented at the annual Joint Statistical Meetings, Montreal, Canada, August 2013.
* *Testing the Effectiveness of Personal Glossaries for Building Vocabulary and Understanding Concepts in Introductory Statistics*. Poster presented at the annual Joint Statistical Meetings, San Diego, California, August 2012.
* *Using Student Response System Technology for Formative Assessment in Introductory Statistics*. Poster presented at the annual Joint Statistical Meetings, Vancouver, Canada, August 2010.
* *Using JMP Scripting Language to Teach Sampling and Inference for the Proportion*. Poster presented at the annual Joint Statistical Meetings, Washington, D.C., August 2009.
* *Using R in probability and mathematical statistics courses*. Paper presented at the annual Joint Statistical Meetings, Denver, Colorado, August 2008.
* *Teaching introductory statistics with simulations in JMP Statistical Discovery Software*. Poster presented by William M. Duckworth at the annual Joint Statistics Meetings, Denver, Colorado, August 2008.
* *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.

Outside Funding

* Foegen, A. & **Froelich, A.G.** *Algebra Screening and Progress Monitoring*, United States Department of Education, Institute of Education Sciences (IES) ($1,511,427). Funded from July 1, 2011 to June 30, 2017. Co-Principal Investigator from July 1, 2015 to June 30, 2017.
* **Froelich, A.G.** & Cook, D. *Using Electronic Assessments to Inform Student Learning and Instruction in Introductory Statistics*, National Science Foundation, Transforming Undergraduate Education in Science, Technology, Engineering and Mathematics (TUES) ($174,855). Funded from September 15, 2013 to August 31, 2015.
* 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.
* 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.

University Funding

* **Froelich, A.G.** Building Online Assessments for Introductory Statistics Courses, College of Liberal Arts & Sciences Computer Advisory Committee, ($13,000). January 1, 2011 to June 30, 2011.
* **Froelich, A.G.** & Genschel, U. 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.
* 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.
* 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.

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: 2010 - 2012
Redesigned the introductory statistics course to include extensive use of the course management system, online and written homework assessments, labs, and clicker assessments in lecture. Development was funded through grants from the LAS Computer Advisory Committee. Served as basis for NSF Grant from 2013 – 2015.

Statistics for Master of School Mathematics Program, 2008 - 2011
Developed and taught in Summer 2008 and Summer 2011 a new 6-credit hour graduate level course in Statistics for the Master of School Mathematics Program. 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 also incorporates 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. Course was added to course catalog for 2013 - 2014.

Orientation Course for First-Year Graduate Students in Statistics, 2007 - 2009
Developed a weekly orientation seminar for first-year graduate students in statistics. The seminars introduce students to the expectations and functions of TAs and RAs in the department, provide examples of instructional and grading techniques for topics in introductory statistics, and provide students information on degree requirements and opportunities for further development through professional organizations. Other faculty are also invited to discuss their research areas, giving both faculty and students an early opportunity to develop a collaborative relationship.

Statistics for Pre-Service Secondary Mathematics Teachers: 2006 - 2009
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 was approved by the Department of Mathematics and became effective for the 2009-2011 catalog. 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 201), and a calculus-based introduction to probability and mathematical statistics (Statistics 341 and 342).

Statistics 341 and 342: 2005 - 2008
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 101 Honors: 2002 - 2005
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. Initial development was funded through grants from the Miller Faculty Fellowship program and NSF. 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 in the mathematical sciences and in fields 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. Formed the basis of new course Statistics 201 in 2013 - 2014 course catalog.

Professional Practice and Consulting

Consulting

Assessment of ERS Analysis and Identification of Outstanding Issues: Food Insecurity Measurement Papers, 2008 to 2012. Consulted (along with Dr. Helen Jensen and Dr. Matthew Johnson) with Dr. Mark Nord from Educational Research Service at the United States Department of Agriculture on an assessment of the Current Population Survey Food Security Supplement. This involved a complete statistical review of five working papers on different aspects of the analysis of Food Security Supplement as suggested by the Committee on National Statistics report *Food Insecurity and Hunger in the United States: An Assessment of the Measure* from 2005. Final workshop for this project occurred on September 30, 2011 at the ERS offices in Washington, D.C. with the final report submitted to the USDA on March 16, 2012.

Psychology in Education Research Laboratory (PERL), Department of Curriculum and Instruction, College of Human Sciences, 2005 to 2009.
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*
* Reviewer for book chapters in Teaching Statistics in School Mathematics - Challenges for Teaching and Teacher Education: A joint ICMI/IASE Study
* Article reviewer for *Journal of Statistics Education*
* Article reviewer for *Statistics Education Research Journal*
* Article reviewer for *Technology Innovations in Statistics Education*

* Article reviewer for *The American Statistician*

Service to Iowa State University and Profession

Department

* Undergraduate Committee, 2000 – 2020 (Chair 2007 – 2009, 2015 – 2020)
* Student-Faculty Committee on Instruction, 2000 – 2020 (Co-Chair 2001 – 2009, 2011 – 2012)
* Faculty Search Committee, 2008 – 2009, 2015 (Chair), 2019
* Curriculum Committee, 2006 – 2009, 2017 – 2020 (Co-Chair 2017 – 2020)
* Strategic Planning Committee, 2004 – 2006
* Departmental Program Outcomes and Assessment Semester Workshop, Fall 2003
* Library Committee, 2002 – 2003
* Faculty Advisor for STAT-ers (statistics graduate student group), 2001 – 2003

College

* LAS Adviser Advisory Committee, 2019-2020
* LAS Undergraduate Advising Coordinator, 2006 – 2009, 2010 – 2020
* LAS ad-hoc Committee on Data Science Major, 2016 – 2017
* LAS ad-hoc Committee on Actuarial Science Programs, 2016 – 2018
* LAS Honors Committee, 2010 – 2016 (Chair 2012 – 2015)
* LAS Scholarship Committee, 2012 – 2014
* 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 – 2009.
* Representative to the Math Transitions Congress, sponsored by the Board of Regents, State of Iowa, at the University of Northern Iowa, November 2007.

Profession

* American Statistical Association Waller Award Committee Member, 2013 – 2018.
* Associate Editor, Journal of Statistics Education, 2010 – 2018.
* External Review, Statistics Program, St. Olaf College, 2016.
* Chair, American Statistical Association Committee to Review the Mathematical Association of America 2015 Curriculum Guide to Majors in the Mathematical Sciences, 2014.
* Elected Member at Large, Executive Committee of the Statistical Education Section, American Statistical Association, 2012 – 2014.
* Participant in the American Statistical Association Member Initiative Workshop on Graduate Programs in Statistics Education, University of Minnesota, September 2012.
* Invited Session Organizer for Joint Statistics Meetings, 2011.
* Participant in the American Statistical Association Member Initiative Workshop on Graduate Programs in Statistics Education, Washington, D.C., October 2008.