COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE/if not in response to a program announcement/solicitation enter NSF 13-1

PD 14-7513 **02/04/14**

FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) (Indicate the most specific unit known, i.e. program, division, etc.)

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NSF PROPOSAL NUMBER

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SHOW PREVIOUS AWARD NO. IF THIS IS
☐ A RENEWAL
☐ AN ACCOMPLISHMENT-BASED RENEWAL

IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? YES ☐ NO ☒ IF YES, LIST ACRONYM(S)

NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE

Augsburg College

AWARDEE ORGANIZATION CODE (IF KNOWN)

0023341000

ADDRESS OF AWARDEE ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE

Augsburg College
2211 Riverside Avenue
Minneapolis, MN. 554541338

NAME OF PRIMARY PLACE OF PERF

Augsburg College

ADDRESS OF PRIMARY PLACE OF PERF, INCLUDING 9 DIGIT ZIP CODE

Augsburg College
2211 Riverside Avenue
Minneapolis ,MN ,554541338 ,US.

IS AWARDEE ORGANIZATION (Check All That Apply) (See GPG II.C For Definitions)
☐ SMALL BUSINESS ☐ MINORITY BUSINESS
☐ FOR-PROFIT ORGANIZATION ☐ WOMAN-OWNED BUSINESS

☐ IF THIS IS A PRELIMINARY PROPOSAL THEN CHECK HERE

TITLE OF PROPOSED PROJECT **Statistics for the Social Science and the Humanities: Chance, Causation and Confounding**

REQUESTED AMOUNT	PROPOSED DURATION (1-60 MONTHS)	REQUESTED STARTING DATE	SHOW RELATED PRELIMINARY PROPOSAL NO. IF APPLICABLE
$ **716,047**	**60** months	**08/15/14**	

CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW

☒ BEGINNING INVESTIGATOR (GPG I.G.2)
☐ DISCLOSURE OF LOBBYING ACTIVITIES (GPG II.C.1.e)
☐ PROPRIETARY & PRIVILEGED INFORMATION (GPG I.D, II.C.1.d)
☐ HISTORIC PLACES (GPG II.C.2.j)
☐ EAGER* (GPG II.D.2) ☐ RAPID** (GPG II.D.1)
☐ VERTEBRATE ANIMALS (GPG II.D.6) IACUC App. Date _____
PHS Animal Welfare Assurance Number _____

☐ HUMAN SUBJECTS (GPG II.D.7) Human Subjects Assurance Number _____
Exemption Subsection _____ or IRB App. Date _____
☐ INTERNATIONAL COOPERATIVE ACTIVITIES: COUNTRY/COUNTRIES INVOLVED (GPG II.C.2.j)
_____

PI/PD DEPARTMENT

PI/PD FAX NUMBER

PI/PD POSTAL ADDRESS
2211 Riverside Avenue
Minneapolis, MN 554541338
United States

NAMES (TYPED)	High Degree	Yr of Degree	Telephone Number	Email Address
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CO-PI/PD				
CO-PI/PD				
CO-PI/PD				

CERTIFICATION PAGE

Certification for Authorized Organizational Representative (or Equivalent) or Individual Applicant

By electronically signing and submitting this proposal, the Authorized Organizational Representative (AOR) or Individual Applicant is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding conflict of interest (when applicable), drug-free workplace, debarment and suspension, lobbying activities (see below), nondiscrimination, flood hazard insurance (when applicable), responsible conduct of research, organizational support, Federal tax obligations, unpaid Federal tax liability, and criminal convictions as set forth in the NSF Proposal & Award Policies & Procedures Guide,Part I: the Grant Proposal Guide (GPG). Willful provision of false information in this application and its supporting documents or in reports required under an ensuing award is a criminal offense (U.S. Code, Title 18, Section 1001).

Conflict of Interest Certification

When the proposing organization employs more than fifty persons, the Authorized Organizational Representative (or equivalent) is required to complete the following certification regarding Conflict of Interest:
By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent) is certifying that the organization has implemented a written and enforced conflict of interest policy that is consistent with the provisions of the NSF Proposal & Award Policies & Procedures Guide, Part II, Award & Administration Guide (AAG) Section IV.A; that to the best of his/her knowledge, all financial disclosures required by that conflict of interest policy have been made; and that all identified conflicts of interest will have been satisfactorily managed, reduced or eliminated prior to the organization's expenditure of any funds under the award, in accordance with the organization's conflict of interest policy. Conflicts which cannot be satisfactorily managed, reduced or eliminated must be disclosed to NSF.

Drug Free Work Place Certification

By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent), is providing the Drug Free Work Place Certification contained in Exhibit II-3 of the Grant Proposal Guide.

Debarment and Suspension Certification

(If answer "yes", please provide explanation.)

Is the organization or its principals presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency? Yes ☐ No ☒

By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent) or Individual Applicant is providing the Debarment and Suspension Certification contained in Exhibit II-4 of the Grant Proposal Guide.

Certification Regarding Lobbying

This certification is required for an award of a Federal contract, grant, or cooperative agreement exceeding $100,000 and for an award of a Federal loan or a commitment providing for the United States to insure or guarantee a loan exceeding $150,000.

Certification for Contracts, Grants, Loans and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:
(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, ''Disclosure of Lobbying Activities,'' in accordance with its instructions.
(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Certification Regarding Nondiscrimination

By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent) is providing the Certification Regarding Nondiscrimination contained in Exhibit II-6 of the Grant Proposal Guide.

Certification Regarding Flood Hazard Insurance

Two sections of the National Flood Insurance Act of 1968 (42 USC §4012a and §4106) bar Federal agencies from giving financial assistance for acquisition or construction purposes in any area identified by the Federal Emergency Management Agency (FEMA) as having special flood hazards unless the:
(1) community in which that area is located participates in the national flood insurance program; and
(2) building (and any related equipment) is covered by adequate flood insurance.

By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent) or Individual Applicant located in FEMA-designated special flood hazard areas is certifying that adequate flood insurance has been or will be obtained in the following situations:
(1) for NSF grants for the construction of a building or facility, regardless of the dollar amount of the grant; and
(2) for other NSF grants when more than $25,000 has been budgeted in the proposal for repair, alteration or improvement (construction) of a building or facility.

Certification Regarding Responsible Conduct of Research (RCR)
(This certification is not applicable to proposals for conferences, symposia, and workshops.)

By electronically signing the Certification Pages, the Authorized Organizational Representative is certifying that, in accordance with the NSF Proposal & Award Policies & Procedures Guide, Part II, Award & Administration Guide (AAG) Chapter IV.B., the institution has a plan in place to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduates, graduate students and postdoctoral researchers who will be supported by NSF to conduct research.
The AOR shall require that the language of this certification be included in any award documents for all subawards at all tiers.

CERTIFICATION PAGE - CONTINUED

Certification Regarding Organizational Support

By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent) is certifying that there is organizational support for the proposal as required by Section 526 of the America COMPETES Reauthorization Act of 2010. This support extends to the portion of the proposal developed to satisfy the Broader Impacts Review Criterion as well as the Intellectual Merit Review Criterion, and any additional review criteria specified in the solicitation. Organizational support will be made available, as described in the proposal, in order to address the broader impacts and intellectual merit activities to be undertaken.

Certification Regarding Federal Tax Obligations

When the proposal exceeds $5,000,000, the Authorized Organizational Representative (or equivalent) is required to complete the following certification regarding Federal tax obligations. By electronically signing the Certification pages, the Authorized Organizational Representative is certifying that, to the best of their knowledge and belief, the proposing organization:
(1) has filed all Federal tax returns required during the three years preceding this certification;
(2) has not been convicted of a criminal offense under the Internal Revenue Code of 1986; and
(3) has not, more than 90 days prior to this certification, been notified of any unpaid Federal tax assessment for which the liability remains unsatisfied, unless the assessment is the subject of an installment agreement or offer in compromise that has been approved by the Internal Revenue Service and is not in default, or the assessment is the subject of a non-frivolous administrative or judicial proceeding.

Certification Regarding Unpaid Federal Tax Liability

When the proposing organization is a corporation, the Authorized Organizational Representative (or equivalent) is required to complete the following certification regarding Federal Tax Liability:

By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent) is certifying that the corporation has no unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

Certification Regarding Criminal Convictions

When the proposing organization is a corporation, the Authorized Organizational Representative (or equivalent) is required to complete the following certification regarding Criminal Convictions:

By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent) is certifying that the corporation has not been convicted of a felony criminal violation under any Federal law within the 24 months preceding the date on which the certification is signed.

AUTHORIZED ORGANIZATIONAL REPRESENTATIVE	SIGNATURE	DATE
NAME **Erica Swift**	**Electronic Signature**	**Feb 4 2014 5:57PM**

TELEPHONE NUMBER	EMAIL ADDRESS	FAX NUMBER
	swift@augsburg.edu	

* EAGER - EArly-concept Grants for Exploratory Research
** RAPID - Grants for Rapid Response Research

NATIONAL SCIENCE FOUNDATION
Division of Undergraduate Education

NSF FORM 1295: PROJECT DATA FORM

The instructions and codes to be used in completing this form are provided in Appendix II.

1. **Program-track** to which the Proposal is submitted: **IUSE: IUSE Projects**
2. Name of **Principal Investigator/Project Director** (as shown on the Cover Sheet):
   Schield, Milo
3. Name of submitting **Institution** (as shown on Cover Sheet):
   Augsburg College
4. **Other Institutions** involved in the project's operation:

Project Data:

A. Major Discipline Code: **89**
B. Academic Focus Level of Project: **BO**
C. Highest Degree Code: **B**
D. Category Code: **--**
E. Business/Industry Participation Code: **NA**
F. Audience Code: _ _ _ _ _ _ _ _
G. Institution Code: **PRIV**
H. Strategic Area Code: _____
I. Project Features: **F** _ _ _ _

Estimated number in each of the following categories to be directly affected by the activities of the project during its operation:

J. Undergraduate Students: **1000**
K. Pre-college Students: **0**
L. College Faculty: **800**
M. Pre-college Teachers: **0**
N. Graduate Students: **0**

PROJECT SUMMARY

Overview:

The goal of this grant is train 800 statistical educators at US four-year colleges to teach a statistics course (sometimes described as a statistical literacy course) specifically designed for students in the social sciences and the humanities, a course that focuses more at least as much on confounding as on chance, a course that focuses at least as much on ordinary English as on algebraic formulas, a course that social science and humanities majors value and recommend that it be required of all students for graduation.

The biggest problem in achieving this goal is teacher training. Statistics is most easily taught by deduction and calculation. Retraining statistics teachers to teach statistics as a liberal art is almost as difficult as retraining philosophy faculty to teach philosophy as a social science.

This project is ready for rapid dissemination via online training. The W. M. Keck Foundation supported phase 1 with a $500K grant. The Principle Investigator funded the development of a textbook, student exercises (used by over a thousand students), a respected website (www.StatLit.org with 180,000 visits during 2013) and faculty training materials (used by faculty at three colleges).

This proposal requests about $715,000 over five years (1) to complete the materials and website needed for teacher training, (2) to provide low-cost online teacher-training to 800 college teachers, (3) to provide stipends to 50 teachers who will use these materials in teaching statistics courses and provide written reports on their experience, and (4) to launch online teacher-training as an ongoing operation.

Intellectual Merit :

Most students taking statistics (1) are in non-STEM majors, (2) take their statistics in departments outside the traditional STEM disciplines, (3) are in departments that require statistics as part of their majors, (4) are in majors where observational studies are much more common than clinical trials, (5) are in majors that use statistical associations as evidence of causal connections, (6) see less value in statistics after taking the course than they did before, and (7) will get jobs that require them to read and interpret data.

The goal of this project is to modify introductory statistics to be of greater value to students in the social sciences and the humanities: to reform ? if not revolutionize ? the teaching of statistics in non-STEM disciplines; to revamp introductory statistics for greater relevance and appeal. The ultimate goal is to prepare students to read and interpret everyday statistics as part of their job and their life.

This will be done by helping students think critically about statistics. It will focus more on how confounding, definitions and bias can influence associations and statistical significance in observational studies. The emphasis is on what the statistics mean rather than on their calculation. This focus has a strong research basis.

Broader Impacts :

By reuniting statistics with the liberal arts ? by shifting the focus from deductive right-wrong reasoning to practical-inductive strength-of-evidence reasoning, this project has both intellectual merit and cultural impact. This will be done by using ordinary English to describe subtle ideas involving ratios, algebra and calculus that arise in traditional statistics and epidemiology. By teaching students how to think critically about statistics in arguments, teachers can help them develop a life-long skill. This project has the potential to impact the 42% of high school graduates who have good math skills but show no interest in a STEM major. This project can set the stage for a new generation of statistical educators, improve students? attitudes toward statistics and create a new doorway to STEM.

TABLE OF CONTENTS

For font size and page formatting specifications, see GPG section II.B.2.

*Proposers may select any numbering mechanism for the proposal. The entire proposal however, must be paginated. Complete both columns only if the proposal is numbered consecutively.

Project Description

Statistics for the Social Science and the Humanities

Project Goal:

The project goal is *"to develop and operate an online teacher-training program for those teaching statistics to students in the social sciences and the humanities."*

The content of this project is based on extensive research into the statistics used in the everyday media, the English grammar used to describe statistics and their relationships, and the nature of the statistics commonly used in the social sciences and humanities. The materials have been student and faculty tested.

To accomplish this training quickly and on a national scale requires a "turnkey" system: a well-tested online system for faculty development with high-quality educational materials. This online system has:

(1) A 400 page textbook that covers the four sources of influence on a statistic: chance, confounding, assembly (how groups are defined, combined or compared) and error or bias. Having a student-tested textbook (with a four-page index and a nine-page glossary of key terms) allows students to proceed at their own pace in a totally online class.

(2) Online audio-slide presentations that cover the highlights of each chapter in the textbook. Students who are not "readers" are pleased to listen to an audio presentation that accompanies a power-point slide presentation. They enjoy hearing a human voice; they may pick up clues about what is important or subtle much quicker in this mode.

(3) Student-tested Moodle right-wrong exercises (over 100) for topics presented in a given chapter. Having all the right-wrong multiple choice exercises on line allows students to work at their own pace and get immediate feedback on what they have – and have not – mastered.

(4) A unique online grammar program that gives students immediate feedback on errors in how they use ordinary English (percent/percentage, rate/ratio, chance/odds/risk/probability) to describe and compare counts, rates and percentages as presented in graphs, tables and sentences, and studies. Non-native English speakers – and many native English-speakers – find subtle grammatical distinctions very frustrating. They may not realize the difference in the following:

- "the percentage of women who are runners" vs. "the percentage of women among runners."
- "20% of high school dropouts who are male return to get a GED" vs. "the percentage of high school dropouts who are male and return to get a GED is 20%."
- "widows are more likely to suicide than are widowers" vs. "widows are more likely among suicides than are widowers"
- "Most schizophrenics fail test X" vs. "Most people who fail test X are schizophrenics."

(5) A unique online forum where everyone is anonymous, everyone grades everyone and the system summarizes the grades received by each player. Students are given challenges involving the use of everyday statistics in the graphs, tables, surveys, studies and experiments. See Schield (2014). Students need practice to develop statistical literacy as a habit of mind. They need to apply what they have learned in different contexts. Student who may find algebra demoralizing enjoy using their language skills to analyze statistical issues. They enjoy seeing how others approach an essay or argument. They know they are honing their critical thinking skills. See Schield (2014).

(6) A privately controlled web site (www.StatLit.org) that hosts the grammar program and student and faculty resource materials. It is Google-rated as #2 in statistical literacy after Wikipedia with 175,000 visits in 2013. Having a privately controlled website gives the PI direct control.

All six elements are needed to provide faculty with a balanced understanding of statistical literacy.

The following summarizes calls for statistical literacy and presents four themes where statistical literacy differs from traditional statistics: association, causation, confounding and coincidence.

Calls for Statistical Literacy by Statistical Educators:

Statistical leaders have called for improving statistical literacy. The following quotes are in date order:

Helen Walker (1951), past President of the American Statistical Association, discussed statistical literacy in the social sciences. "To a very striking degree our culture has become a statistical culture. Yet **the level of statistical literacy** among the practitioners of the social sciences is appallingly low." "The computational skills of our field [statistics] can be acquired in a fairly short time. Judgment, the ability to interpret, the clarification of concepts and the ability to plan a survey or an experiment are of slower growth. Consequently the one-semester introductory course in which students learn a variety of computations will inevitably turn out a large number of semi-literates."

Dennis Haack (1979), the author of the first **statistical literacy** textbook, wrote "Teaching **Statistical Literacy**." In it he said "More people have to read and understand others' statistics than have to carry out their own statistical research." "A first course in statistics should teach statistics as a language rather than as a research tool. Emphasis should be on interpreting statistics rather than on calculating statistics."

Kathleen Wallman (1993), past President of the American Statistical Association (ASA) chose "Advancing **Statistical Literacy**" as the theme for all the meetings of the ASA in 1993.

Anne Hawkins (1997), Past-President of the Centre for Statistical Education in the UK, said: "I remain somewhat sceptical that we should be satisfied with Statistics for All policies. Our true objective should rather be **Statistical Literacy** for All…" "My reforms would first involve a change of emphasis in our teaching objectives…" "I would argue in favour of 'Statistical Literacy for All', that emphasizes understanding over facts and tools..." "Statistics for All, in the absence of literacy, is worthless." "**Statistical Literacy** for All must be the bread on which some may spread butter, jam, or even caviar."

David Moore (1998), Past President of the American Statistical Association, defined **statistical literacy** as "what every educated person should know [about statistics]."

In 2004, *Peer Review*, a publication of the American Association of Colleges and Universities, featured an article titled "**Statistical Literacy and Liberal Education at Augsburg College**." Schield (2004b)

In 2006, the ASA endorsed the GAISE guidelines. The GAISE College report stated that: "introductory courses in statistics should, as much as possible, strive to: 1) emphasize **statistical literacy** and develop statistical thinking…" The GAISE PreK-12 report stated: "the ultimate goal: **statistical Literacy**." "A **statistically literate** high school graduate will know how to interpret the data in the morning newspaper and will ask the right questions about statistical claims." "An investment in **statistical literacy** is an investment in our nation's economic future as well as the well-being of individuals" and "**Statistical literacy** is essential in our personal lives as consumers, citizens and professionals."

Allan Rossman (2007), Past President of the ASA Section on Statistical Education, in his plenary slide presentation at USCOTS noted: "You simply can't achieve these [GAISE **statistical literacy**] goals in one course if you also teach a long list of methods." "Most students would be better served by a Stat 100 [**statistical literacy**] course than a Stat 101 [research methods] course."

In 2009, the Mathematical Association of America SIGMAA-QL surveyed all US four-year colleges. Of the 275 that replied, 19% offered a course they called **Statistical Literacy**.

J. Michael Shaughnessy (2010), NCTM President, noted "I've been increasingly impressed by how important **statistical literacy** has become for all of us around the globe. **Statistical literacy** has risen to the top of my advocacy list, right alongside numeracy, and perhaps even ahead of 'algebra for all'."

Wired Magazine selected

The next four pages present four key themes in teaching statistics to students in the social science and the humanities.

Theme 1: Association:

Traditional statistics typically describes an association between two quantitative variables saying the closer they are to forming a straight line the stronger the association. Such associations are typically described by saying, "As X increases, Y increases (or decreases)."

For most students, association involves a difference –not a similarity. If we say that pregnancy is strongly associated with gender, we mean there is a big difference in the pregnancy rates between men and women. If we say that smoking is strongly associated with lung cancer, we mean there is a big difference in the lung-cancer rates between smokers and non-smokers.

Measures of association can be transformed to appear as nothing more than simple counts. Schield (2009, 2011) called these *speculative statistics* or *spotty statistics*. They are arguably the fastest growing type of statistic in our society. The statistics involve the number of deaths, injuries or accidents attributable to being a member of a particular group. Consider this data:

- The rate of Alzheimer's decline unfolded 4% more quickly per extra year of education.
- For every can or glass of sugar-sweetened beverage a child drank [a day] …, a child's chance of becoming obese increased 60%.
- Each hour of television watched per day at ages 1-3 increases the risk of attention problems, such as ADHD, by almost 10 percent at age 7.
- Junk food causes a third of heart attacks.

While all these outcomes (Alzheimer's, obesity, attention problems and death) are real, most students fail to recognize that none of these causes are verified by anyone. All of these cause-related numbers are model based.

Calculating these numbers is simple. Suppose that the death rate among those not exposed to second hand smoke is 20% lower than the death rate among those exposed to second hand smoke. Epidemiologists would say that 20% of the deaths among smokers **are attributable** to being a smoker. Once we know the total number of deaths among smokers (an observable fact), we multiply that by 20% to get the number of smoker deaths **attributable to** smoking.

Schield (2009) gave this example. In 2004, US deaths per year due to overweight were estimated at 400,000. In 2005, this was corrected to 365,000. One year later, the US deaths per year due to overweight were estimated at 26,000. How can these numbers change so much? Everyone used the same sources of data. The difference in rates between two groups depends critically on what confounders are taken into account. Welcome to the speculative statistics.

Citizens are being deluged with these statistics. They have no way of knowing they are model-based – and that the models have their assumptions. Those teaching traditional statistics have neither time, training nor motivation for this topic.

Students at Augsburg use simple statistics to calculate events attributable to being members of a given group: college acceptances attributable to wearing glasses, death sentences attributable to being white, etc. They analyze news stories that feature these speculative statistics.

Most statistical educators have never studied epidemiology so training is be required.

Theme 2: Causation:

Statistical literacy starts by distinguishing association from causation. Both concepts are deep and subtle; students have trouble separating them. Less than a tenth of all statistics textbooks mention causation in their index and if they do there is usually just a single entry to the phrase "association is not causation."

Causation is a very tricky concept – especially for philosophers, judges, lawyers, scientists, statisticians and statistical educators. Students have difficulty distinguish association from causation. I have yet to see an introductory statistics textbook that mentions Sir Bradford Hill's nine criteria for inferring causation from an observed association in an observational study.

Based on an analysis of news stories, Schield (2011a) classifies association-causation words:

- *Causation*: cause/causes, effects, results, prevents
- *Association*: associate/association, relate/related, correlate/correlated,
- *Between* (67%): Action verbs such as ups, cuts, raises, boosts, increases and other phrases such as due to, because of, attributed to.

Between words and phrases are commonly used to imply causation without actually asserting causation. Most students – indeed most adults – are totally unaware of that subtle distinction.

To see how this applies in the everyday media, consider this progression of eleven news headlines – all dealing with the same underlying story:

1. Study: 45,000 Uninsured Die a Year (CBS News)
2. 45,000 deaths *attributable to* uninsurance
3. 45,000 US deaths *associated with* lack of insurance
4. No health coverage *tied to* 45,000 deaths a year
5. Lack of insurance *linked to* 45,000 deaths
6. Study: 45,000 U.S. Deaths *From* Lack of Insurance
7. One death every 12 minutes *due to* no health insurance
8. 45,000 ... die *because of* lack of health insurance
9. Lack of Health Insurance *Kills* 45,000 a Year
10. Lack of Health Insurance *causes* 44,789 deaths
11. Lack of insurance *to blame for* almost 45,000 deaths

Unless they are statistically literate most students – indeed most adults – would not see the following statements as unobserved *Causal* or *Between* claims about observed associations.

Since most statistical educators have not had much experience in dealing with ordinary English, they will require significant training before they can internalize and then teach this kind of nuanced understanding.

Theme 3: Confounding:

Most students have never used – much less heard – of confounding. But they all know about alternate explanations. Most students have never considered the possibility that alternate explanations might apply to numbers. They never encountered confounding in any math class they took including AP calculus or AP statistics. Most have never considered the idea that statistics are more than numbers; that statistics are numbers with a context and that the context matters. Occasionally they encounter confounders:

- Unemployment (the number) is higher in Texas than in Iowa; unemployment (the rate) is lower.
- Hawaii has a higher auto death rate than Arkansas (per driver); Hawaii has a lower auto death rate than Arkansas (per mile of highway).
- City hospital has a higher patient death rate than Rural hospital. After classifying patients into two groups (fair condition vs. poor condition), City hospital has a lower patient death rate among patients in each group than did Rural. This is an example of Simpson's paradox: a reversal of an association after taking into account a related factor.

Confounding is arguably the biggest problem in inferring causation from an association in observational studies. Since observational studies are most common in the humanities and the social sciences, confounding is arguably the biggest problem those students need to understand. Yet, confounding is seldom listed in the index of introductory statistics textbooks. Confounding was even absent from the McKenzie (2004) list of the 30 core concepts of statistics education.

Consider the claim, association is not causation. The examples given to support this claim invariably involve confounding. E.g., the Berkeley gender discrimination case. But confounding disappears after that point. Students are never told that a statistically significant result from an observational study can become statistically-insignificant after controlling for confounding.

In the last 12 years, three articles have resurrected confounding from statistical obscurity:

Wainer (2002) publicized a new graphical technique that allowed teachers to illustrate the influence of a binary confounder on a statistical association.

Schield (2006e) publicized this graphical standardization technique in *Stats* magazine. That article has been accessed more than 15,000 times from the StatLit.org website. Of the 787 statistics papers hosted on StatLit.org, this 8-year old paper ranked #3 in terms of downloads (3,709) during 2013.

> Tintle et al., (2013), some of the top leaders in Statistical education, argued that "**confounding** and variation [are] two substantial hindrances to drawing conclusions from data"; are "the two major themes of statistical analysis…" They argued that "the concepts of **confounding** and variation are multivariable concepts that students should deepen their understanding of." They advocated "a curriculum that places conceptual understanding of variability and **confounding** at the center,"

Augsburg students in the humanities and the social sciences have been working problems involving confounding using this graphical technique for over 10 years. These students like seeing what it means to "take into account" or "control for" a related factor or influence. Augsburg College is arguably the world's leader in integrating confounding into the introductory statistics curriculum.

Isaacson (2005) introduced hypothetical thinking: described the art of giving alternate explanations that might explain the observed association. Hypothetical thinking is thinking outside the data – outside the box. This type of thinking is seldom brought up in either mathematics or statistics. But it is central in thinking about how strong is the evidence for the truth of an inductive argument. Students in the humanities find this activity reassuring since they do this kind of reasoning in their majors.

At an invited roundtable of international statistical educators, Schield (2004b) strongly advocated including confounding in the intro curriculum. He showed how controlling for a confounder could change a statistically-significant result into one that was insignificant – and vice versa. Participants were asked if students should be shown that statistical significance can be influenced by a confounder in all introductory statistics courses?" In an anonymous survey, eight circled 'strongly agree', seven circled 'generally agree', and one circled 'indifferent/undecided.' The real issue is the cost. When these same people were asked, "Should introductory statistics teach students more about confounding even if that means less time for statistical significance?", seven circled 'generally agree,' four circled 'indifferent/undecided' and five circled 'disagree.'

When asked why confounding was conspicuously absent, one leader in statistical education said "including confounding could bring disrespect to our discipline." If students knew how easily statistical conclusions could be changed – if not reversed – they wouldn't appreciate the power of statistics.

This conclusion is shared by students when they first learn that about Simpson's paradox: that an association can be reversed after taking into account the influence of a confounder.

This concern about how easily confounders can nullify or reverse is unjustified.

To address this concern, Statistical Literacy course focuses on the historical controversy between Lord Fisher (arguably the pre-eminent statistician of his time) and Jerome Cornfield (a US epidemiologist) on whether smoking caused cancer. Both men were aware the smoker-cancer data was obtained from an observational study and could be easily influenced by an unknown or unmeasured confounder. Fisher (a smoker) even produced data from a German twins' study showing that smoking preference was related to the kind of twin-ship. In his reply, Cornfield proved that in order to nullify or reverse the observed association (smokers were 10 times as likely to die of lung cancer as were non-smokers), Fisher's confounder had be at least as big as the observed association. Fisher's genetic example involved a factor of two. Fisher never replied and the US surgeon General concluded that smoking caused cancer.

Schield (1999d) summarized the Fisher-Cornfield controversy, presented Cornfield's derivation of his necessary condition for reversal and then translated Cornfield's necessary condition into a simple graphical comparison. Peter Westfall, past-editor of The American Statistician, called this "A great paper."

Schield echoed Rosenbaum's statement about the Cornfield conditions: "Their statement is an important conceptual advance. The advance consists in replacing a general qualitative statement that applies in all observational studies by a quantitative statement that is specific to what is observed in a particular study. Instead of saying that an association between treatment and outcome does not imply causation, that

hidden biases can explain observed associations, they say that to explain the association seen in a particular study, one would need a hidden bias of a particular magnitude. If the association is strong, the hidden bias needed to explain it is large." [Rosenbaum used 'hidden bias" as a synonym for confounder.]

Schield argued that Cornfield's necessary condition is the second most important contribution of statistics to human knowledge – exceeded only by Fisher's popularization of randomized trials.

Augsburg students use this graphical comparison technique to see whether a confounder could reverse an observed association. To our knowledge, this technique is not taught at any other college in the world.

Schield and Burnham (2003) derived other necessary conditions in order for a binary confounder to nullify or reverse an observed association involving a binary predictor. Courses that introduce confounding without presenting the full set of necessary condition are a real disservice to the students and to the statistics profession.

I've been surprised to find statistical educators that had never heard of Simpson's paradox. In my experience, few – if any – have any knowledge of the Cornfield conditions. So long as confounding is not part of their teaching, these topics never arise. Providing training for the vast majority of statisticians in the US – much less world wide – so they can teach confounding will take a major effort.

Theme 4: Coincidence:

Chance (randomness) is central to introductory statistics. Invariably the focus is on variability in averages or proportions. But as sample size increases, a given difference becomes statistically significant. Big data" can be defined as data so big that every association of any two variables is statistically significant.

Sill, sampling error is central to understanding variability. It underlies web-based A/B testing. Wainer (2007) has called it "the most dangerous equation" saying "Ignorance of how sample size affects statistical variation has created havoc for nearly a millennium." With less time for chance, statistical literacy needs to focus less on derivation; more on impact. Students study how the Gates' Foundation investment on smaller schools arguably wasted a million dollars based on ignorance of this equation.

Margin of error is shown in most surveys. But that is the maximum margin of error for the entire sample. Students need to see how this survey margin of error increases when applied to subgroups but decreases when applied to very small or very large percentages. Statistical significance appears much often than p-value in the everyday media. Statistical literacy echoes Utts (2003) in studying "the difference between statistical significance and practical importance, especially when using large sample sizes." Statistical significance is introduced as soon as possible beginning with Fisher's tea test so students can handle that phrase throughout the course.

Students must become extremely familiar the influence of chance in medical or drug tests for three reasons: (1) they may experience a false positive, (2) they make a hiring/firing decision based on a false positive and (3) they need to understand hypothesis testing. In drug tests, they often presume that when an HIV test is said to be 99.9% accurate that means they have a 99.9% chance of having HIV given a positive result. But if they are a member of those that don't engage in risky sex practices and they don't drugs with shared/dirty needles, their chance of having HIV may be less than 50%. They never realized that 99.9% accurate is ambiguous: it obscures the difference between accuracy in confirming a known condition with accuracy in predicting an unknown condition. Doing this also sets the stage for hypothesis testing where the chance the alternate is true replaces the prevalence of the disease in the population.

Medical testing can introduce a touch of Bayesian thinking into hypothesis tests. When the research hypothesis is more likely than not (the typical case), a Bayesian could say that a statically-significant result is evidence the null is false. But when the research hypothesis is less likely than not (e.g., ESP), a Bayesian could say that a statistically-significant hypothesis is weak evidence that the null is false. To

discredit the null, the p-value must be smaller than the chance the alternate is true. This is extremely relevant when tests for ESP return extremely small p-values. Schield (1998a).

Schield (2012b) argued that a statistically insignificant in a clinical trial has three distinct explanations: (1) The association is real, but the sample size is too small to distinguish the results from those due to chance. (2) The association is spurious – a coincidence due to chance, and (3) the association is real but the mixture of potential outcomes – causal heterogeneity – may give results that are indistinguishable from those due to chance. This is an extremely important finding for students majoring in psychology where randomization is most common. Schield went further and argued that 'causal heterogeneity' is a "Big Deal". Drug companies spend billions per year on clinical trials. Many – if not most – give results that are not statistically significant, or they are rejected because of adverse effects. What if many of these rejected treatments were extremely effective for a population subgroup or had minimal adverse effects for a subgroup? Could it be that our model of statistical significance and the design of clinical trials is largely responsible for the high cost of new drugs in the US?

Statistical literacy goes beyond what is presented in traditional research methods course. Students study – and work problems – showing how statistical significance can be transformed into statistical insignificance – and vice versa – in observational studies after controlling for a confounder. For students in the social sciences and the humanities, this is arguably the most important new idea in a statistical literacy course as compared a traditional research methods course. The failure to introduce this idea to students that must deal with observational studies is arguably professional negligence. Schield (2004)

But as pointed out in presenting confounding, this doesn't mean any confounder can transform statistical significance into insignificance –or vice versa. Still Terwilliger and Schield (2004) found "64 Simpson's reversals in the NAEP 2002 Grade 8 reading data of which 18 involve initial differences that are statistically significant." Students in the social sciences need to recognize that small differences may be statistically significant – but are more vulnerable to the influence of confounders. The larger the effect size, the less vulnerable the association is to a confounder of a given size (the larger the confounder effect needed to nullify or reverse the association).

But chance goes beyond statistical significance. A prediction interval is useful in determining whether a deviation in a time series is meaningful (c.f., global temperatures).

Coincidences is a major theme; coincidences are newsworthy. Raymond and Schield (2008) analyzed 273 statistics-based news stories. Of these, 10% included the phrase "unlikely due to chance" whereas 5% mentioned "confidence level" and only 3% mentioned "statistically significant".

Students dealing with big data must recognize that the bigger the dataset the more likely that rare coincidences will emerge. They need to understand the Law of Very Large Numbers in its general form and in its quantitative form:

- The impossible becomes almost certain given enough tries.
- If an outcome has one chance in N of occurring on the next try, then at least one of those events or outcomes is expected in the next N tries. At least one of the events is more likely than not to occur in the next N tries. Schield (2009).

Most statistics courses state that association is not causation. But few – if any – demonstrate this by using chance. If students are to appreciate how chance can create amazing coincidences, they must see this in ways they can appreciate. In statistical literacy, students work with Excel demos showing unlikely runs of 10 heads in a row (less than one chance in a 1,000) consistently. See Schield (2012c). Students work with extremely unlikely grains of rice (1 chance in 100) creating incredibly unlikely patterns on the two-dimensional board. See Schield (2012d). Students find

unlikely patterns (a one chance in a million) consistently. In both cases, students use these hands-on activities to internalize the law of very large numbers.

Other Excel-based hands-on activities include demonstrating von Mises' birthday problem (Schield, 2012e), Marilyn vos Savant's Monty Hall Three-Door problem (Schield 2010e) and Marilyn vos Savant's Four-Envelope problem (Schield 2010f).

The law of large numbers explains the slow process of unguided evolution. The relation between chance and what is expected explains why we expect someone to have won two major lotteries. It may even explain clusters of rare events. Picking out amazing coincidences after the fact (winning the lottery twice) can be seen as something that is expected given enough trials. See Schield (2005b).

Students need to look for replication before taking the results of a single trial as definitive. There is no deduction that proves that the null hypothesis is false given a statistically-significant result. Students need to be intelligent consumers of statistics – able to read and interpret the results generated by statisticians and statistical software.

Again statistical educators will need training to shift from an over-riding emphasis on statistical inference (deriving sampling distributions, margin of error, various hypothesis tests and statistical significance) to a much broader view of randomness that is much more in line with what students will experience in their everyday personal and professional lives.

Project Background and Rationale:

BACKGROUND: In 1995, Dr. Schield began developing Statistical Literacy at the RSS Centre for Statistical Education in Nottingham England. In 1998, Augsburg College authorized Dr. Schield's Statistical Literacy course as an approved catalog course in General Studies (GST 200). The goal was to help students be better citizens, so statistical literacy focused on the use of statistics in the general news media. At the beginning of a course, few if any of the students would take it as an elective. After completing the course, over 50% thought that "all students should be required to take this course for graduation." In 2001, the W. M. Keck Foundation awarded Augsburg College a $500,000 grant "*to develop statistical literacy as an interdisciplinary curriculum in the liberal arts*."

In 2002, Project Director Schield conducted the W. M. Keck Statistical Literacy survey of students, data professionals and teachers on three continents. In 2004, Dr. Schield was asked by the AACU's Peer Review to write "*Statistical Literacy and Liberal Education at Augsburg College.*" See Schield (2004a). He was invited to present "*Statistical Literacy Curriculum Design*" for an international roundtable on curriculum design by the International Association of Statistical Educators (IASE). See Schield (2004c). And in 2004 Capella University decided to adopt Schield's statistical literacy course for use on-line.

By the end of the Keck grant in 2005, a dozen faculty had observed the Statistical Literacy course at Augsburg and reviewed the materials, Peter Holmes and Joel Best had spoken at Augsburg and had reviewed some of the materials, and a textbook had been published. The textbook has been used by over a thousand students at Augsburg College and Capella University.

Even though the Keck grant ended in 2005, activity on statistical literacy has continued. In 2006 Dr. Schield was asked to prepare "*Presenting Confounding and Standardization Graphically*" for STATS magazine – a publication of the American Statistical Association (ASA).

Schield (2006f) applied for an NSF grant: Developing a Statistical Literacy Turnkey Training System. This was turned down. One reason was that it was submitted under a phase 1 heading but should probably have been submitted under phase 2.

During the past eight years, Schield has self-funded the development of the premier web site – www.StatLit.org – dedicated exclusively to statistical literacy. During 2013 it had more than 265,000

downloads, 190,000 visits, 150,000 page views and 47,000 home page views. These numbers are incredible for a web site that is not affiliated with any institution. This website contains much more than just Schield's papers and textbook. It has 69 separate web pages of which less than six involve Schield or Schield's web programs in any way. It hosts 1,187 pdfs: 787 papers and 327 slides. Of these Schield has authored or coauthored 253 pdfs: 138 papers and 115 slides.

This web site is critical to the success of this project. It allows for immediate dissemination of project details to the target audience: statistical educators. It allows for rapid dissemination of new materials. More importantly it goes outside the traditional disciplinary boundaries of the MAA, ASA, etc. Many – if not most – of those teaching statistics outside STEM departments are not aligned with the MAA or the ASA. Simply posting advertisements in the MAA or ASA magazines are expected to reach a small minority of those teaching statistics in non-STEM departments. This project has what is arguably the best "place" to advertise what this project plans to accomplish. Furthermore, Schield has "web-followers" for his papers. Schield (2006a), Percentage Graphs in USA Today, has been downloaded a total of 93,216 times as of 2013 year-end. Schield (2006b), Presenting Confounding and Standardization Graphically, has been downloaded 15,329 times. Schield (2011a), Statistical Literacy: A New Mission for Data Producers, has been downloaded 7,642 times. These download numbers greatly exceed the estimated number of statistical educators at US four-year colleges.

Based on the experience of Augsburg faculty in trying to teach this material, training – extensive training – is absolutely essential. Large numbers of faculty have expressed this interest in these topics by the kinds of articles they have chosen to read. This project can satisfy their needs effectively and efficiently.

Basis on which this project rests

It is easy to say what is wrong with anything. It is fairly easy to prescribe something that might improve anything. But unless there is some basis in reality for a prescription, it is not likely to succeed.

This statistical literacy training project rests on empirical findings and on personal experience:

1. Empirical research on how everyday statistics are presented in the media: in graphs, tables, surveys, studies and controlled experiments. This course is based on empirical data rather than on some rationalistic view of how statistics should be described.
    a. Empirical research on the prevalence of statistics in news stories. Raymond and Schield (2009) studied 278 news stories. See also Schield (2005, 2006 and 2007).
    b. Empirical research on how quantitative data is described and compared using WordBanks: the world's largest data base of written and spoken English in both the US and the UK. This project analyzed over a hundred-thousand lines containing words describing and comparing numbers, percentages, ratios and rates. This involved several years of analysis and several papers: Schield (1999b, 2000, 2001, 2007 and 2011) and Schield and Burnham (2007).
    c. Empirical research on 229 graphs featured in USA Today. See Schield (2006).
2. Surveys of college educators and knowledge workers on how they understand various statistical literacy topics. See Schield 2006 ICOTS and IASSIST, 2009 and 2010 Wiley.
3. Student feedback based on more 10 years of experience in teaching statistical literacy to over a thousand students.
4. Ten years of experience by the PI in teaching critical thinking at Augsburg College and in attending national conferences on teaching critical thinking.
5. Personal experience of the PI and co-PI in shifting our thinking from a narrow view of statistics (math-based deduction supporting statistical inference) to a much broader view of statistics

(language-based, induction that studies all sources of influence on a statistics). This process may take years. Shifting from algebra to ordinary English is hard; shifting from deduction to induction is hard; shifting from one right answer to multiple acceptable answers is hard. Doing this took us years. We don't expect teachers to make this change during their training session. Faculty from Keene State faculty completed training in 2012. They said they needed a refresher a year later – even though they had taught the full course in between. This personal experience colors the entire faculty development process.

Design and Goals of the Training Program

The design for this faculty training program (a program designed to help teachers teach statistical literacy) was presented in an application for an earlier NSF grant in 2006. During the intervening 8 years, most of those elements have been developed and tested. Now the project is ready for rapid dissemination.

Phase 1: Advertising this faculty development program.

Advertising will be done in four ways: (1) Web advertising at www.StatLit.org with a dedicated page plus an announcement on the home page. (2) Annual two-day conferences where faculty exchange their experiences. (3) Advertisements in appropriate publications such as the AAC&U, etc. and (4) Invited seminars at US four-year colleges and universities.

Phase 2: Attend a Conference [Project goal is at least 200]

Every year during the five-year grant, this project will hold a two-day conference that introduces the four themes of statistical literacy. Participants can get a good idea of the commitment required.

Phase 3: Take the Training [Project goal is 800]

All training is offered online. In the first two years of the project, the first faculty to sign up will be given a small stipend provided they complete the entire training and complete the associated surveys.

Three different online sites will be involved. (1) The home site, www.StatLit.org will have the advertising, the details on the online training, the conference signup and a list of those that have completed the training. (2) The Moodle site which hosts the right-wrong Moodle exercise along with the student grade-books; (3) The Odyssey site which hosts the challenges and the participant's response and reviews of other participants. A second Odyssey will be maintained for faculty to exchange their likes and dislikes while being completely anonymous to encourage independent judgments and ideas to be posted without any restriction and without any possibility of being called out.

This Statistical-Literacy teacher-training program was field tested online with 10 teachers from Keene State College in summer 2012. Their comments were helpful in deciding how to modify the program to improve the experience for future teachers. The length of the program will be at least six weeks – perhaps eight weeks. This will be adjusted based on the feedback of the faculty who participate. The Keene faculty thought five weeks was too short.

Phase 4: Implementation. Goals: 50 adopt the entire course; 100 implement a fifth; 300 implement a part

Faculty have several choices on how to implement what they have learned. (1) To adopt the training course in its entirety. To use the textbook, the training syllabus, the training Moodle exercises and the Odyssey program for written responses. (2) To adopt at least a fifth of the training course as a part of a regular course. Various elements might be introduced gradually as the teacher becomes comfortable with each element. (3) To adopt just small parts of the training course and see what to do after that. (4) to abstain from implementation perhaps until one has time to investigate this matter further.

Faculty who adopt the program in its entirety and complete a written report of their experience are eligible to receive a $2,000 stipend from this grant. Some of the faculty receiving stipends will be invited to speak at subsequent conferences on their experiences.

These are ambitious goals. Making a change of this magnitude is more than just a new textbook, a new pedagogy or even some new content. This involves a change in one's thinking – and that takes time.

Work Plan

The project goal is *"to develop and operate an online teacher-training program for those teaching statistics to students in the social sciences and the humanities."* The proposed work plan is designed to achieve this goal.

1. CREATE, REFINE AND DISSEMINATE EDUCATIONAL MATERIALS
   - 1a. Update textbook Statistical Literacy: Seeing the Story behind the Numbers/
   - 1b. Create a brochure introducing this faculty development
   - 1c Create web-based Power point with audio introducing web-based faculty development courses.
   - 1d. Create a web-based drill program to help students analyze news articles involving statistics.
   - 1e. Analyze use of double ratios as evidence for causation for an ASA paper.
   - 1f. Create workbook of classroom activities that demonstrate StatLit ideas.

2. UPDATE WEB SITES
   - 2a. StatLit: Convert inline code to style sheets. Convert from Front Page to MS Expression or newer
   - 2b. StatLit: Insert improved navigation. Test system for functionality.
   - 2c. Moodle: Generate new exercises to accompany the 100+ existing exercises (700 questions)
   - 2d. Moodle: Test new exercises with students prior to faculty training use.
   - 2e. Odyssey: Test new challenges that are better suited to faculty development

3. CREATE AND DELIVER FACULTY DEVELOPMENT
   - 3a. Create full web-based faculty development Statistical Literacy course in Moodle.
   - 3b. Deliver 8 week faculty development session in summer 2014.
   - 3c. Hold first Statistical Literacy conference in June at Augsburg College.
   - 3d. Repeat 3b and 3c in subsequent years. May offer training during the school year.

4. MONITOR AND ASSESS FACULTY DEVELOPMENT PROGRAM
   - 4a. Assess response of faculty being trained annually. Present results to outside assessor.
   - 4b. Outside assessor reviews materials provided and conducts independent assessment.
   - 4c. Outside assessor make recommendations on improving the project.
   - 4d. Present results of annual survey to StatLit Board of Advisors.
   - 4e. Board of Advisors makes recommendations on improving the project.

The web-based faculty development is structured in two versions: full and mini. The full version covers

Marketing is an essential part of this project. Dr. Schield will be responsible for creating statistical literacy brochures for prospective teachers of statistical literacy. These brochures will "advertise" this new turn-key system including faculty development. They will be distributed whenever Dr. Schield gives a talk whether at a conference for statisticians (ASA), for mathematicians (MAA), for the MAA Quantitative Literacy Special Interest Group (MAA QL SIG) or for the National Numeracy Network (NNN). He will also be responsible for creating a web-based Power-point presentation with audio that introduces the Statistical Literacy faculty development courses: the full course and the mini courses.

Assessment is an essential part of this project. Dr. Schield is responsible for formative assessment. An outside independent assessor is being recruited to provide both analysis and guidance on this project.

Project Review: Board of Advisors

Control of a project is always important. Monitoring and controlling a project that sets outside to accomplish a major change in the way that teachers think needs a great deal of control. Just because the PI may have had some good ideas does not make them right on everything. The board of advisors will involve faculty who have already taught a statistical literacy course or are very familiar with that kind of course. They will be required to participate in the training program – so they know exactly what is being done. They will be required to submit an annual review from their perspective on the good and bad of what has been accomplished along with recommendations on what should be done. Their reviews will be provided to the project assessor.

Project Review: Assessment

Assessment is another way in which this project will be subject to external control. The assessor will receive all survey results obtained from those faculty in the training program, and all reviews and recommendations from the Board of Advisors.

At the start of the project, the Principal Investigator will prepare a plan to assess the entire project: to identify the planned surveys and questionnaires. The project assessor will evaluate this plan and give helpful feedback. At the end of the project, the Principal Investigator will send copies of the feedback from the teacher-participants to the project assessor for evaluation. The assessor will complete a report annually which will be submitted to the NSF and to the Board of Advisors. In this way all three groups (Board, Assessor and NSF) will have the same information. At the end of the project, the project assessor will complete a summative assessment of the entire project.

Intellectual Contribution

This project supports quantitative rhetoric, critical thinking about statistics as evidence in arguments,

This project has the ability to make a major – if not an historic – contribution to the exchange of ideas between STEM and the humanities – between those who enjoy thinking quantitatively or formulaically and those who would much rather use ordinary English. This project has the ability to bridge the two cultures described by Snow (1959) when he said: "the intellectual life of the whole of western society was split into the titular two cultures — namely the sciences and the humanities — and that this was a major hindrance to solving the world's problems."

This project provides the humanities with the tools they need to understand and evaluate statistical evidence, and to describe and compare statistics using ordinary English – and to do so using the tools they know best: practical (inductive) reasoning based on breadth and strength of evidence.

This project gives guidance to statistical educators who are much more comfortable with the cleanliness of formal notation and formulas than they are with the ambiguity in ordinary English.

Project Broader Impact

The goal of this project is to impact the teaching of statistics by teachers at US four-year colleges. In so doing, it may also impact the teaching of statistics at two-year colleges and at high schools. The goal of this project is readily quantifiable: to create and administer a teacher training program to train 800 teachers for less than $800,000.

This project is expected to be self-sustaining and continue after the end of the grant. By keeping the price low and the perceived value high, there is no reason this project couldn't reach thousand of teachers over the next 10 years.

We have argued that this Statistical Literacy Teacher-Training project has **intellectual merit** and that implementing this project will have **broad impact**. We will review how this project fits in with the NSF criteria and priorities:

In terms of the CCLI cyclic model, this project involves "Creating new learning materials and teaching strategies," "Developing Faculty Expertise" and "Implementing Educational Innovations."

- By focusing on the quantitative needs of students who don't take a quantitative course, this project satisfies the CCLI learning materials & teaching strategies criteria which states that "All projects should lead to exemplary models that address the varied needs of the Nation's diverse undergraduate student population. They may include activities that help faculty develop expertise in adapting these innovations and incorporating them effectively into their courses, the next step in the cycle."
- By focusing strongly on faculty development, this project satisfies the CCLI cyclic model's "developing faculty-expertise" condition that "successful projects should provide professional development for a diverse group of faculty so that new materials and teaching strategies can be widely implemented."
- By focusing on the generation of papers and the giving of talks at national conferences in different disciplines, this project satisfies the CCLI cyclic model's implementing educational innovation criteria: "To ensure their broad based adoption, successful educational innovations (such as learning materials, teaching strategies, faculty development materials, assessment and evaluation tools) and the research relating to them should be widely disseminated."

This project also addresses other features considered important by NSF:

- Quality, Relevance and Impact: This project clearly addresses a recognized need for quantitative training by students in non-quantitative majors. As data increases, the ability to read and interpret data becomes increasingly relevant. Statistical Literacy is relevant to life in a modern society and it will have a major impact if it can help students make better judgments as informed citizens.
- Use of and Contribution to Knowledge about STEM education. This project reflects the highest quality thinking about the applications of mathematical, statistical and epidemiological thinking to the quantitative needs of undergraduates as citizens. It builds on projects in statistics and quantitative literacy such as the Chance project.
- STEM Education Community Building: This project provides extensive opportunity for interactions between the investigators and others in the undergraduate STEM community. The PI will be attending six national conferences during this 18 month project. At those conferences in which the PI gives a paper, there will be extensive interaction. At the national meetings of the American Statistical Association, the PI has held 8 statistical literacy sessions involving faculty from outside mathematics and statistics. A similar session is planned during this grant.
- Expected Measurable Outcomes: This project has goals and objectives that are translated into measurable outcomes that can be used to track progress, guide the project and evaluate its ultimate success. Such outcomes include student satisfaction with the new web-based drills and faculty satisfaction with the new "turn-key" system.
- Project Evaluation: This project has plans for both formative and summative assessment. Both forms of assessment were in place in the last grant from the W. M. Keck Foundation and they will be continued in this project.

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Schield, Milo (2006b). Statistical Literacy Survey Results, 2006 IASSIST. See www.StatLit.org/pdf/2006SchieldIASSIST.pdf.

Schield, Milo (2006c). Statistical Literacy Survey Analysis: Reading Tables and Graphs of Rates and Percentages. International Conference on Teaching Statistics. At www.StatLit.org/pdf/2006SchieldICOTS.pdf.

Schield, Milo (2006d). Percentage Graphs in USA Today Snapshots Online, 2006 American Statistical Association Proceedings of the Section on Statistical Education. [CD-ROM] 2364-2371. See www.StatLit.org/pdf/2006SchieldASA.pdf.

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Schield, Milo and Cynthia Schield (2007). Numbers in the News: A Survey, 2007 American Statistical Association Proceedings of the Section on Statistical Education. [CD-ROM] 2243-2250. See www.StatLit.org/pdf/2007SchieldASA.pdf.

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Schield, Milo (2011b). Statistical Literacy: A New Mission for Data Producers. Statistical Journal of the International Association of Official Statistics. 27 (2011) 173–183. Edited by N. Davies and J. Ridgway. DOI 10.3233/SJI-2011-0732 See www.StatLit.org/pdf/2011SchieldSJIAOS.pdf

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Snow, Charles Percy (2001) [1959]. The Two Cultures. London: Cambridge University Press. p. 3. ISBN 0-521-45730-0.

Terwilliger, Jim and Milo Schield (2004). Frequency of Simpson's Paradox in NAEP Data. Presented at AERA. See www.StatLit.org/pdf/2004TerwilligerSchieldAERA.pdf.

Tintle, Nathan; Beth Chance, George Cobb, Alan Rossman, Soma Roy, Todd Swanson and Jill VanderStoep (2013). Challenging the state of the art in post-introductory statistics. Presented at the 2013 ISI World Statistics Conference. Copy at http://www.statistics.gov.hk/wsc/IPS032-P1-S.pdf

Wainer, H. (2002). The BK-Plot: Making Simpson's Paradox Clear to the Masses. CHANCE, 15(3):60-62

Walker, Helen (1951). Statistical Literacy in the Social Sciences. *The American Statistician* Vol. 5, No. 1 (Feb., 1951), pp. 6-12.

Wallman, Katherine (1993). Enhancing Statistical Literacy: Enriching Our Society. *Journal of the American Statistical Association* Vol. 88, No. 421 (Mar., 1993), pp. 1-8.

Biosketch
DR. MILO A. SCHIELD, Principal Investigator (PI)

Professional Preparation:

Iowa State University	Physics	B.S. 1962
University of Illinois	Physics	M.S. 1964
Rice University	Space Physics	Ph.D., 1968

Appointments:

Augsburg College	Department of Business Administration	1985
St. Paul Companies	Senior Operations Researcher	1978
Fox and Co., CPA	Senior Consultant	1975
Bantam Data, Inc.	President	1972
Schield Stock Service, Inc.	President	1970
University of Iowa	Instructor, Physics Department	1968

Products (limited to 10):
Ten significant publications are closely related to this project. The first six are peer-reviewed. For theoretical papers on the mathematics of confounding, see Burnham's biographical sketch.

1. Schield, Milo (2004a). Statistical Literacy and Liberal Education at Augsburg College. *Peer Review,* Sept. 2004, 7-14. American Assoc. of Colleges and Universities. See www.StatLit.org/pdf/2004SchieldAACU.pdf.
2. Schield, Milo (2006b). *Presenting Confounding and Standardization Graphically.* Draft for STATS Magazine. At www.StatLit.org/pdf/2006SchieldSTATS.pdf.
3. Schield, Milo (2004b). Information Literacy, Statistical Literacy and Data Literacy. *IQ (IASSIST Quarterly)*, 7-14. See www.StatLit.org/pdf/2004SchieldIASSIST.pdf.
4. Schield, Milo (2004c). *Statistical Literacy Curriculum Design.* IASE Curriculum Design Roundtable. See www.StatLit.org/pdf/2004SchieldIASE.pdf.
5. Schield, Milo (2008b). Quantitative Literacy and School Mathematics: Percentages and Fractions, *Calculation vs. Context: Quantitative Literacy And Its Implications for Teacher Education*. Edited by Bernard L. Madison and Lynn Arthur Steen. 2008 Mathematical Association of America. P. 87-107. See www.statlit.org/pdf/2008SchieldMAA.pdf or www.maa.org/Ql/cvc/cvc-087-107.pdf.
6. Schield, Milo (2011b). Statistical Literacy: A New Mission for Data Producers. Statistical Journal of the International Association of Official Statistics. 27 (2011) 173–183. Edited by N. Davies and J. Ridgway. DOI 10.3233/SJI-2011-0732 See www.StatLit.org/pdf/2011SchieldSJIAOS.pdf
7. Schield, Milo (2004d). *Three Graphs to Promote Statistical Literacy.* International Conference on Mathematics Education (ICME-10). See www.StatLit.org/pdf/2004SchieldICME.pdf.
8. Schield, Milo (2005a). *Statistical Prevarication: Telling Half Truths Using Statistics.* 2005 International Assoc. of Statistical Educators (IASE). Invited paper, Sydney. At www.StatLit.org/pdf/2005SchieldIASE.pdf.
9. Schield, Milo (2006a). *Statistical Literacy Survey Analysis: Reading Tables and Graphs of Rates and Percentages.* International Conference on Teaching Statistics. At www.StatLit.org/pdf/2006SchieldICOTS.pdf.
10. Terwilliger, Jim and Milo Schield (2004). *Frequency of Simpson's Paradox in NAEP Data.* Presented at the American Educational Research Association. See www.StatLit.org/pdf/2004TerwilligerSchieldAERA.pdf.

Synergistic Activities (limited to five examples):

1. He has taught traditional statistics for over 20 years; he has taught critical thinking at the undergraduate level for 6 years and at the graduate level for two; he has taught statistical literacy to students in non-quantitative majors for the past 18 years.

2. He is the US Representative to the International Statistical Literacy Project. He has served as the President of the Twin Cities chapter of the ASA and the Vice President of the National Numeracy Network. He is an elected member of the International Statistical Institute.

3. He has given papers on philosophy and the philosophy of science.

   - Schield, Milo (2004). Resolving Three Key Problems in the Humanities. *The International Journal of the Humanities*. Vol. 2, Num. 3. P. 2375-2385. See www.StatLit.org/pdf/2004SchieldNDIH.pdf.

   - Schield, Milo (2005). Making Science a Core Liberal Art for the 21st Century. Project Kaleidoscope. See www.StatLit.org/pdf/2005SchieldPKAL.pdf.

4. He has organized sessions on statistical literacy at the last 13 national meetings of the American Statistical Association. Speakers have included Dr. Donald Rubin (Harvard), Dr. Joel Best, author of *Damned Lies and Statistics*, Joe Abramson, author of *Making Sense of Data,* Nicholas Eberstadt, author of *The Tyranny of Numbers,* Jessica Utts, author of *Seeing Through Statistics*, Robyn Dawes, author of *Everyday Irrationality*, Vic Cohen, author of *News and Numbers,* Tom Wonnacott, author of numerous statistics textbooks and Jane Miller, author of *The Chicago Guide to Writing about Numbers.*

5. He has been recognized by his peers. In his book, *More Damned Lies and Statistics,* author Joel Best titled the last chapter, *Toward Statistical Literacy.* After noting the many problems facing this movement, he said, "*Despite these obstacles, a small educational movement advocating statistical literacy has emerged. Professor Milo Schield, Director of the W. M. Keck Statistical Literacy Project at Augsburg College in Minneapolis, is the movement's leading voice*."

Collaborators and Co-Authors:

Tom Burnham, Cognitive Consulting in San Antonio, TX.
Jim Terwilliger, Minnesota Department of Education, NAEP Coordinator for the State of Minnesota.

Thesis advisor and Post-graduate Sponsor: None.

Biosketch
Marc Isaacson, Co-Principal Investigator (Co-PI)

Professional Preparation:

St Olaf College	Economics and Statistics	B.S. 1994
Rensselaer Polytechnic Institute	Mfg. Systems Engineering	M.S. 1995

Appointments:

Augsburg College	Department of Business Administration	2002-Present
Capella University	Instructor / SME – Statistics	2004-2006
University of St Thomas	Instructor, QMCS Department	1999-Present
Innovex Incorporated	Quality Engineering Mgr.	1998-2001
R.P.I.	Teaching Assistant, Decision Sciences	1994-1996
St Olaf College	Teaching Assistant, Economics / Acctg	1991-1994

Products (limited to 10):

1. Isaacson, Marc (2005). Statistical Literacy – Online at Capella University. *2005 American Statistical Association Proceedings of the Section on Statistical Education* [CD-ROM] 2244-2252. See www.StatLit.org/pdf/2005IsaacsonASA.pdf.
2. Isaacson, Marc (2012). Lost: Assessing Student Basic Survival Skills in the Statistical Wilderness Using Real Data. *2012 American Statistical Association Proceedings of the Section on Statistical Education* [CD-ROM] 2808-1819. See www.statlit.org/pdf/2012-Isaacson-ASA.pdf
3. Isaacson, Marc (2011). *Where Do Statistics Come From? Setting the Table for Introductory Statistics*. Poster presented at the US Conference on Teaching Statistics, Raleigh, NC. See www.statlit.org/pdf/2011Isaacson-Poster-USCOTS.pdf
4. Isaacson, Marc (2006). *Statistical Literacy: Common Challenges*. Presented at the 2006 JSM of the American Statistical Association. See www.statlit.org/pdf/2006IsaacsonASA6up.pdf.
5. Isaacson, Marc (2008). Using Computer Simulated Surveys to Teach Statistics – A Preliminary Report. *2005 American Statistical Association Proceedings of the Section on Statistical Education* [CD-ROM] 3124-3130. See www.statlit.org/pdf/2008IsaacsonASA.pdf

Synergistic Activities (limited to five examples):

1. He has taught traditional undergraduate statistics since 2002 at three different institutions. In addition, he teaches a number of Management Information Systems courses with a focus on software applications. He has served as the primary faculty and course coordinator for the Quantitative Decision Making for Managers course in the Augsburg MBA program.
2. As part of a collaboration between Augsburg College and Capella University, he served as the Subject Matter Expert in the design and development of online courses in statistics as part of the general education curriculum for Capella University. He designed three on-line courses: two statistics courses and a half-semester course in Statistical Literacy. The on-line statistical literacy course was offered 11 times in the first year. In 2005, results of his course development were presented and published at the JSM meetings of the ASA.
3. He was a founding member of the National Numeracy Network. Recently he has served as a reviewer for multiple articles in the journal Numeracy as well as the Statistics Education Research Journal. He is the current president of the Twin Cities chapter of the ASA. In the past, he has served as the secretary / webmaster of the Twin Cities chapter.

Collaborators and Co-Authors:

No collaborators and no co-authors
Thesis advisor and Post-graduate Sponsor: No contact in the last 48 months.

SUMMARY PROPOSAL BUDGET

YEAR 1

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION
Augsburg College

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR
Milo Schield

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Milo Schield - Principal Investigator**	0.00	0.00	2.00	**22,381**	
2. **Marc Isaacson - Co-PI**	0.00	0.00	2.00	**16,010**	
3.					
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	4.00	**38,391**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**0**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**0**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**38,391**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**2,937**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**41,328**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**12,000**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **13,000**					
2. TRAVEL **0**					
3. SUBSISTENCE **6,000**					
4. OTHER **5,000**					
TOTAL NUMBER OF PARTICIPANTS (**115**) TOTAL PARTICIPANT COSTS				**24,000**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**0**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**9,500**	
3. CONSULTANT SERVICES				**15,750**	
4. COMPUTER SERVICES				**28,000**	
5. SUBAWARDS				**0**	
6. OTHER				**2,000**	
TOTAL OTHER DIRECT COSTS				**55,250**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**132,578**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **Modified Total Direct Costs (Rate: 30.0000, Base: 108578)**					
TOTAL INDIRECT COSTS (F&A)				**32,573**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**165,151**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**165,151**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME
Milo Schield

ORG. REP. NAME*
Erica Swift

FOR NSF USE ONLY		
INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

YEAR 2

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION: **Augsburg College**

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR: **Milo Schield**

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Milo Schield - Principal Investigator**	0.00	0.00	2.00	**22,829**	
2. **Marc Isaacson - Co-PI**	0.00	0.00	2.00	**16,331**	
3.					
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	4.00	**39,160**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**0**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**0**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**39,160**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**2,996**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**42,156**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**6,000**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **29,000**					
2. TRAVEL **0**					
3. SUBSISTENCE **7,200**					
4. OTHER **5,000**					
TOTAL NUMBER OF PARTICIPANTS (**160**) TOTAL PARTICIPANT COSTS				**41,200**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**0**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**8,750**	
3. CONSULTANT SERVICES				**17,250**	
4. COMPUTER SERVICES				**2,000**	
5. SUBAWARDS				**0**	
6. OTHER				**3,000**	
TOTAL OTHER DIRECT COSTS				**31,000**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**120,356**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **Modified Total Direct Costs (Rate: 30.0000, Base: 79156)**					
TOTAL INDIRECT COSTS (F&A)				**23,747**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**144,103**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**144,103**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME: **Milo Schield**

ORG. REP. NAME*: **Erica Swift**

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INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

YEAR 3

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION: **Augsburg College**

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR: **Milo Schield**

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Milo Schield - Principal Investigator**	0.00	0.00	2.00	**23,285**	
2. **Marc Isaacson - Co-PI**	0.00	0.00	2.00	**16,657**	
3.					
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	4.00	**39,942**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**0**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**0**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**39,942**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**3,056**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**42,998**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**9,000**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **20,000**					
2. TRAVEL **0**					
3. SUBSISTENCE **11,200**					
4. OTHER **5,000**					
TOTAL NUMBER OF PARTICIPANTS (**240**) TOTAL PARTICIPANT COSTS				**36,200**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**0**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**6,750**	
3. CONSULTANT SERVICES				**15,750**	
4. COMPUTER SERVICES				**1,000**	
5. SUBAWARDS				**0**	
6. OTHER				**2,000**	
TOTAL OTHER DIRECT COSTS				**25,500**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**113,698**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **Modified Total Direct Costs (Rate: 30.0000, Base: 77498)**					
TOTAL INDIRECT COSTS (F&A)				**23,249**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**136,947**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**136,947**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME: **Milo Schield**

ORG. REP. NAME*: **Erica Swift**

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INDIRECT COST RATE VERIFICATION		
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 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

YEAR 4

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION: **Augsburg College**

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR: **Milo Schield**

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Milo Schield - Principal Investigator**	0.00	0.00	2.00	**23,751**	
2. **Marc Isaacson - Co-PI**	0.00	0.00	2.00	**16,990**	
3.					
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	4.00	**40,741**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**0**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**0**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**40,741**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**3,117**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**43,858**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**9,000**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **20,000**					
2. TRAVEL **0**					
3. SUBSISTENCE **12,800**					
4. OTHER **5,000**					
TOTAL NUMBER OF PARTICIPANTS (**290**) TOTAL PARTICIPANT COSTS				**37,800**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**0**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**6,000**	
3. CONSULTANT SERVICES				**17,750**	
4. COMPUTER SERVICES				**2,000**	
5. SUBAWARDS				**0**	
6. OTHER				**4,000**	
TOTAL OTHER DIRECT COSTS				**29,750**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**120,408**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **Modified Total Direct Costs (Rate: 30.0000, Base: 82608)**					
TOTAL INDIRECT COSTS (F&A)				**24,782**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**145,190**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**145,190**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME: **Milo Schield**

ORG. REP. NAME*: **Erica Swift**

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 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

YEAR 5

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION: **Augsburg College**

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR: **Milo Schield**

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Milo Schield - Principal Investigator**	0.00	0.00	2.00	**24,226**	
2. **Marc Isaacson - Co-PI**	0.00	0.00	2.00	**17,330**	
3.					
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	4.00	**41,556**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**0**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**0**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**41,556**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**3,179**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**44,735**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**6,000**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **16,000**					
2. TRAVEL **0**					
3. SUBSISTENCE **12,800**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**388**) TOTAL PARTICIPANT COSTS				**28,800**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**0**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**6,000**	
3. CONSULTANT SERVICES				**11,000**	
4. COMPUTER SERVICES				**2,000**	
5. SUBAWARDS				**0**	
6. OTHER				**4,000**	
TOTAL OTHER DIRECT COSTS				**23,000**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**102,535**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **Modified Total Direct Costs (Rate: 30.0000, Base: 73735)**					
TOTAL INDIRECT COSTS (F&A)				**22,121**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**124,656**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**124,656**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME: **Milo Schield**

ORG. REP. NAME*: **Erica Swift**

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 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

Cumulative

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION: **Augsburg College**

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR: **Milo Schield**

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Milo Schield - Principal Investigator**	0.00	0.00	10.00	**116,472**	
2. **Marc Isaacson - Co-PI**	0.00	0.00	10.00	**83,318**	
3.					
4.					
5.					
6. ( ) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	20.00	**199,790**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**0**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**0**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**199,790**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**15,285**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**215,075**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**42,000**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **98,000**					
2. TRAVEL **0**					
3. SUBSISTENCE **50,000**					
4. OTHER **20,000**					
TOTAL NUMBER OF PARTICIPANTS (**1,193**) TOTAL PARTICIPANT COSTS				**168,000**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**0**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**37,000**	
3. CONSULTANT SERVICES				**77,500**	
4. COMPUTER SERVICES				**35,000**	
5. SUBAWARDS				**0**	
6. OTHER				**15,000**	
TOTAL OTHER DIRECT COSTS				**164,500**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**589,575**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)					
TOTAL INDIRECT COSTS (F&A)				**126,472**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**716,047**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**716,047**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME: **Milo Schield**

ORG. REP. NAME*: **Erica Swift**

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INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

C ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

Budget Justification

Statistics for the Social Science and the Humanities

A) Senior Personnel **($199,790 requested)**

Milo Schield, PhD. Principal Investigator, 2 summer months per year.

Dr. Schield, Professor Business Administration, will be responsible for the overall implementation and execution the proposed project.

Professor Marc Isaacson, MS, Co-PI, 2 summer months per year.

Professor Isaacson, Assistant Professor of Business Administration, will support Dr. Schield with the implementation and execution the proposed project. Specifically, he will be responsible for administering the faculty training program.

B) Other Personnel **($0 requested)**

C) Fringe Benefits **($15,284 requested)**

Fringe benefits have been estimated at 28.5% for all personnel in the academic year and 7.65% (FICA) in the summer. Actual costs for fringe benefits are charged (billed) to the sponsored project at the time the cost is incurred, according to salary dedicated to the project, selected benefits package, and other variables applicable to the individual employee.

D) Equipment **($0 requested)**

E) Travel **($42,000 requested)**

Domestic travel is requested to support project activities. Expenses are estimated at $1,500 per person per travel, which includes transportation, lodging, meals (per-diem), and conference registration. All trips are to attend national conferences and to disseminate information on this project. National conferences include American Statistical Association (ASA), US Conference on Teaching Statistics (USCOTS), Project Kaleidoscope (PKAL), National Numeracy Network (NNN), American Sociological Assoc (ASA), American Association of Colleges and Universities (AAC&U) and conferences involving communications and the humanities. Additional trips are to attend conferences sponsored by this grant that are held at remote locations.

Year 1: PI and co-PI attend 8 total conferences: $12,000
Year 2: PI and co-PI attend 4 total conferences: $6,000
Year 3: PI and co-PI attend 6 total conferences: $9,000
Year 4: PI and co-PI attend 6 total conferences: $9,000
Year 5: PI and co-PI attend 4 total conferences: $6,000

F) Participant Support Costs **($168,000 requested)**

Stipends

Stipends will be provided to faculty and teachers who review training curriculum, beta test, teach curriculum in the classroom, or complete online training.

Year 1: $200 x 15 Reviewers = $3,000; $200 x 50 Beta Testers = $10,000
Year 2: $2,000 x 10 curriculum users = $20,000; $100 x 90 trainees = $9,000
Year 3: $2,000 x 10 curriculum users = $20,000
Year 4: $2,000 x 10 curriculum users = $20,000
Year 5: $2,000 x 8 curriculum users = $16,000

Subsistence
Meals will be provided to conference attendees to encourage networking and support continuous training over the meal hours. Meals are estimated at $60-$80 per person, per day, depending on the location of the conference.

Year 1: $60/attendee/day x 50 attendees x 2 days = $6,000
Year 2: $60/attendee/day x 60 attendees x 2 days = $7,200
Year 3: $80/attendee/day x 70 attendees x 2 days = $11,200
Year 4: $80/attendee/day x 80 attendees x 2 days = $12,800
Year 5: $80/attendee/day x 80 attendees x 2 days = $12,800

Other
Textbooks will be provided to faculty and teachers who complete the online training.

$50 x 400 textbooks = $20,000

G) Other Direct Costs **($164,500 requested)**

Publication Costs/Documentation/Dissemination
Dissemination is an important component of this project and will largely be accomplished through advertising and conferences. We have budgeted a total of $37,000 over 5 years to support advertising costs and facilities rental.

Consultant Services (includes stipends and travel expenses)
Consultants have three primary responsibilities. (1) Checking the accuracy and readability of the newly developed training materials, (2) verifying that the web-based sites are operating properly and making any necessary changes or fixes, and (3) responding to participant problems with any of the software systems. This line also includes expenses involving the project advisory board ($400/person-year for five members) and the project assessor ($10,000 for the entire project).

Computer Services
Funds are requested to convert the existing web site (www.StatLit.org) from Front page to a current product such as MS Expression or WebMatrix. This website has an outstanding reputation as the largest site dedicated entirely to statistical literacy. It is the home of the US International Statistical Literacy Project (ISLP). This upgrade ($28,000) will allow for the expansion needed to handle this project. It also includes $5,000 for generating web training videos.

Other
We request travel and lodging for invited speakers at the project's hosted conferences.

$1,000 x 15 total speakers (over entire project period) = $15,000

H) Total Direct Costs: $589,574

I) Indirect Costs: $126,472
Indirect costs have been calculated at 30% of a Modified Total Direct Cost (MTDC) base for the duration of the project. This rate is based on Augsburg's federally negotiated facilities and administration rate with DHHS.

J) Total Project Costs: $716,046

$716,046 is a large budget. It is certainly influenced by the number of faculty undergoing training. It could easily be reduced by reducing the number of faculty being trained.

But the goal is not to spend the smallest amount of money; the goal is to make a substantial change in statistical education. This kind of project will only be done once provided it reaches a critical mass.

To be successful it must train a critical mass of the teachers teaching introductory statistics courses outside STEM departments. This critical mass is extremely important. Statistics education has a long history of ignoring the calls for change by its leaders. Schield (2013b) As David Moore said of statistical education in his Rossman (2013) interview, "little of real substance has changed in the past 20 years, the 1997 advent of AP Statistics being the most significant exception." This is a very telling statement. Statistical educators are extremely aware that students see less value in statistics after taking the introductory course than they did before – yet there is no discussion of whether the curriculum is the problem. The assumption is that by improving pedagogy perhaps we can change students' attitudes. The content of today's introductory statistics course is essentially the same as it was in 1950 – almost 70 years ago.

The purpose of this grant is train teachers to teach statistics with an expanded content: content based on the needs of students in the Social Sciences and the Humanities. The current course is basically an introduction to research statistics and is designed for students who minor or major in statistics. An analogy would be to offer Oil or Watercolor Painting to students who wanted Art Appreciation.

Training a critical mass is essential if this major change is to take hold in US four-year colleges. A critical mass is needed to generate sufficient demand for publishers to publish a new type of textbook, for conferences to focus on this new type of content and for word-of-mouth to attract new faculty.

We believe that a critical mass will necessitate training 10% of those full-time faculty teaching statistics outside STEM departments at US four-year colleges. We have considered a high percentage but were concerned that the associated cost might eliminate this project from consideration.

Given the lack of representation by the Social Sciences and the Humanities in the leadership of the MAASIG-QL, the American Statistical Association Section on Statistical Education and the National Numeracy Network (less than 5% of each), a grass-roots movement has got to be large enough to be self sustaining without encouragement by these organizations.

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Milo Schield

Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Statistics for the Social Science and the Humanities: Chance, Causation and Confounding

Source of Support: National Science Foundation

Total Award Amount: $ 715,001 Total Award Period Covered: 08/15/14 - 08/14/19

Location of Project: Augsburg College

Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 2.00

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

 USE ADDITIONAL SHEETS AS NECESSARY

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Marc Isaacson

Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Statistics for the Social Science and the Humanities: Chance, Causation and Confounding

Source of Support: National Science Foundaiton

Total Award Amount: $ 715,001 Total Award Period Covered: 08/15/14 - 08/14/19

Location of Project: Augsburg College

Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 2.00

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

 USE ADDITIONAL SHEETS AS NECESSARY

Facilities, Equipment and Other Resources
Statistics for the Social Science and the Humanities

Laboratory: Not Applicable

Clinical: Not Applicable

Animal: Not Applicable

Computer: All Augsburg project personnel maintain access to encrypted, password protected laptop or desktop computers that are equipped with the latest word processing software and other programs needed to carry out this project. Computers are connected to Augsburg's network, which is routinely backed up and maintained by Augsburg's Information Technology Department. Additional computer and technology support is available through each Department's assigned Liaison For Computing (LFC).

Office: All Augsburg project personnel have between 100 to 150 square feet of assigned office space, with optional access to shared meeting space.

Other: Additional support for both the administrative and financial management of the project will be available from the Office of Sponsored Programs and Administrative Accounting for the duration of the project.

MAJOR EQUIPMENT

Not Applicable

OTHER RESOURCES

Augsburg currently uses Moodle as its academic platform. This project will also use Moodle but from an off-site location. This means that Augsburg will not have to enroll faculty into their system. We discovered this problem in the online training of the faculty from Keene College in 2012.

By using the same software as that used by Augsburg College, we allow our IT department to capitalize on their knowledge of Moodle without the administrative hassle. Augsburg IT will not have any systems responsibility for maintain the Moodle software offsite.

Using Moodle has a second advantage. Faculty who want to adopt this program can run their entire course – at minimal cost – from this remote site. This minimizes their need for special support from their IT department. And they get Moodle course fixes and upgrades for free.

Data Management Plan

Statistics for the Social Science and the Humanities

1. Expected Data

Data produced in this project includes participant survey results (some anonymous, others not), participant essays (anonymous), and participant homework (not anonymous). It also includes project reviews by advisors and the assessor. No information will be released that allows anyone to identify the participant involved (confidentiality).

2. Data Format

All information will be stored in either Word or Excel documents which are normally placed on the web as pdfs.

3. Access to Data and Data Sharing Practices

The goal is to share as much of the data as possible provided it doesn't violate participant confidentiality. All data will be published on www.StatLit.org – the largest web host dedicated exclusively to statistical literacy. This website had more than 265,000 downloads, 190,000 visits, 150,000 page views and 47,000 home page views during 2013.

4. Policies for Reuse

The web site contains two disclaimers. One holding that who-ever provides the article or data retains clear title to such; the second saying that everything hosted is available for public re-use or re-distribution.

5. Archiving data

There is no plan for archiving beyond storing in Word, Excel and as PDFs.