

University of Delaware IRB#

CONSENT TO ACT AS A SUBJECT IN A RESEARCH STUDY

TITLE: Assessment of Teacher and Student Representations of Statistical Content

PRINCIPAL INVESTIGATOR: Nancy C. Lavigne, Ph.D.
Assistant Professor
School of Education
University of Delaware
221 C Willard Hall, Newark, DE 19716-2901
Telephone: 302-831-3109

PURPOSE/DESCRIPTION OF THE RESEARCH

Why is this research being done?

This research is being conducted by Dr. Nancy Lavigne who is interested in examining how students reason and solve problems, particularly in the area of statistics. Dr. Lavigne has recently been investigating a proficiency that leads to successful problem solving, that is, being able to make important connections between concepts and to organize the information in a way that facilitates problem solving.

Toward that end, you are being asked to participate in a research study that aims to examine the following: (a) the knowledge that students acquire from an introductory statistics course; (b) the connections that students make between statistics concepts; (c) the manner in which students organize statistical information as they learn the material; and (d) and the extent to which the organization of students' statistical knowledge reflects the statistics instructors' conceptualize the domain. Knowing the manner in which students organize their knowledge is important because this information reveals the nature of their understandings and misconceptions, which can facilitate or impede successful problem solving. Teachers can use this information to help students develop a stronger understanding of concepts and their relationships within a particular domain, in this case, statistics. Finally, obtaining information about how students' instructors organize their knowledge of statistics can help clarify why certain connections were made and provides a direct mapping onto the instruction.

In this research study, we will examine the nature of students' and instructors' statistical knowledge on three different tasks: a card sorting task, a concept mapping task, and a matching task. Statistics experts will be consulted to determine the appropriate level of performance on each of these tasks.

Who is being asked to take part in this research study?

You are being invited to take part in this research study because you are currently enrolled in an introductory statistics course, you are teaching the statistics course that student participants are taking, or you are a statistics expert who is not teaching the course that student participants are taking. The total participation time for students and teachers who participate in the study for the full term will be approximately 7 hours. Statistics experts' participation in the study will require a maximum of 3 hours of their time.

Approximately sixty individuals who are either males or females between 18-65 years of age will be invited to participate in the study, which will take place at the University of Delaware.

What procedures will be performed for research purposes?

If you decide to take part in this research study, you will undergo the following procedures:

Screening Procedures:

Procedures to determine if you are eligible to take part in a research study are called "screening procedures". For this research study, the screening procedures include:

1. As students participating in the study, you will be asked about the level of your experience with statistics prior to participation in the study. Student participants must be enrolled in an introductory statistics course.
2. As a teacher participant, you must be currently teaching an introductory statistics course that student participants have taken or are presently enrolled in.
3. As statistics experts participating in the study, you must have at least 8 years of experience in teaching statistics but not be teaching one of the introductory courses offered this academic year.

Experimental Procedures:

If you qualify to take part in this research study as a student or teacher participant, you will undergo the following experimental procedures:

1. Prior to commencing the three assessment tasks, you will be required to complete a brief questionnaire that requires demographic information such as age, gender, degree specialization and year, name, number and names of the statistics course taken, course grades in the statistics courses, and identification of other related courses that have been taken (i.e., mathematics, research methods). Completion of this questionnaire should take no more than 3 minutes.
2. You will be required to sort 12 statistics word problems into groups that you deem similar. Once you have sorted the problems, you will be asked a set of interview questions requesting that you explain your sort (e.g., how is this group of problems different from the other? When you say X, what do you mean?). You will sort the same problems again, but this time, you will be given more specific instructions on how to do so. The sorting tasks will be presented at three different times: (a) prior to participation in the study; (b) midway through the term; and (c) at the end of term. You will perform both sorting tasks in a single session at a time that is convenient to you and a researcher. Each session should take approximately 1 hour to complete (30 minutes for the first sort and 30 minutes for the second sort) , for a total of 3 hours over the course of the term. Each session will be audio recorded and transcribed by the principal investigator or by paid research assistants (i.e., undergraduate and/or graduate).
4. You will be required to produce a concept map that identifies the main concepts in statistics and how they connect to each other. You will be given examples of different types of concept maps before starting the task. Once you are ready to perform the task, we will provide you with a list of statistical concepts from which you will select 15 that you think are the most important. You will then draw a map that illustrates how you think these concepts are connected. You will be asked to perform this task at three different times: (a) prior to participation in the study; (b) midway through the term; and (c) at the end of term. You will create the map prior to meeting with a researcher in a session in which you will explain why you choose to represent your knowledge of statistics in the way that you did. Creating the map should take approximately 30-60 minutes to complete while the interview session should take approximately 15 minutes. The total participation time for the concept map is estimated at a maximum of 1 hour and 15 minutes per session for a maximum total of 3 hours and 45 minutes over the course of the term. Each session will be audio recorded and transcribed by the

principal investigator or by paid research assistants (i.e., undergraduate and/or graduate).

5. At the session in which you explained your concept map to a researcher, you will be shown three concept maps that represent statistics in different ways. You will be asked to choose one (if any) of the three that most closely resembles the way in which you conceptualize the relationship among statistical concepts and to explain why. This task will be presented at three different times: (a) prior to participation in the study; (b) midway through the term; and (c) at the end of term. Each individual session should take approximately 5 minutes to complete, for a total of 15 minutes over the course of the term. Each session will be audio recorded and transcribed by the principal investigator or by paid research assistants (i.e., undergraduate and/or graduate).

If you qualify to take part in this research study as an expert, you will undergo the following experimental procedures:

1. You will be required to sort 12 statistics word problems into groups that you deem similar and to explain why particular problems were grouped together. A set of interview questions will be posed to obtain these explanations (e.g., how is this group of problems different from the other? When you say X, what do you mean?). This task should take approximately 30-40 minutes to complete. You will then be asked to sort the same problems in a more specific way and this task should take approximately 20 minutes to complete. These two sessions will be audio recorded and transcribed by the principal investigator or by paid research assistants (i.e., undergraduate and/or graduate).
2. You will be required to produce a concept map that identifies the main concepts in statistics and how they connect to each other. You will be given examples of different types of concept maps before starting the task. You will then draw a map that illustrates how you think concepts are connected, explaining your decisions as you perform the task. This session will be audio recorded and transcribed by the principal investigator or by paid research assistants (i.e., undergraduate and/or graduate). This task should take approximately 60-120 minutes to complete.

CONDITIONS OF SUBJECT PARTICIPATION

Who will know about my participation in this research study?

All records related to your involvement in this research study will be stored in a locked file cabinet. Your identity on these records will be indicated by a case number rather than by

your name, and the information linking these case numbers with your identity will be kept separate from the research records. Only the researcher listed on the first page of this form and her staff will have access to your research records. Your research records will be destroyed at 5 years after publication of the study. In this case, all data will be destroyed on August 31, 2010.

Any information about you obtained from this research will be kept as confidential (private) as possible. You will not be identified by name in any publication of research results unless you sign a separate form giving your permission (release). In unusual cases, your research records may be released in response to an order from a court of law.

Is my participation in this research study voluntary?

Your participation in this research study is completely voluntary. You do not have to take part in this research study and, should you change your mind, you can withdraw from the study at any time without loss or penalty of any kind. Your current and future status at the University (e.g., promotion, field placements, etc.), your grades, and any other benefits for which you qualify will be the same whether you participate in this study or not. Refusal to participate in the study will remain strictly confidential and will not be conveyed to anyone. Should you withdraw from the study, your record of involvement will be expunged. You can also choose to participate but not have the sessions audio taped, in which case only your performance (i.e., sorts, concept map, and choice of expert map) will be recorded. Finally, you can also choose to participate and to have your explanations audio taped but not to release your academic grades. In this case, only your performance and explanations will be recorded.

If I agree to take part in this research study, can I be removed from the study without my consent?

It is possible that you may be removed from the research study by the researcher if, for example, your performance on the three assessment tasks is incomplete, or you have only performed these tasks once.

RISKS AND BENEFITS

What are the possible risks, side effects, and discomforts of this research study?

This research study poses no obvious risks to participants, either physically, psychologically, academically, or professionally. The purpose of the research is to examine how students and teachers with statistics experience organize their statistical knowledge so that tasks can be designed to facilitate the integration of knowledge. The research equipment (i.e., audio recorders) are safe and pose no physical harm to participants.

What are possible benefits from taking part in this study?

You will likely receive no direct benefit from taking part in this research study. Being informed of the results of the study can help you become aware of the ways of linking concepts that are more likely to facilitate the solving of statistics problems. However, such a benefit cannot be guaranteed. A summary of the results and/or copies of publications in which the results are reported can be made available to you by contacting the principal investigator.

FINANCIAL CONSIDERATIONS

There is no compensation for participating in the study at this time.

CONTACTS

For questions regarding details of the research, study procedures, and research findings, please contact Dr. Nancy C. Lavigne, Assistant Professor at the University of Delaware, at 302-831-3109 or nlavigne@udel.edu.

For questions or concerns regarding the rights of individuals who agree to participate in the research, please contact Dr. T. W. Fraser Russell, Vice Provost for Research, University of Delaware at 302-831-4007.

SUBJECT'S ASSURANCES

I am assured that participation in the study is considered voluntary and that I incur no penalties of any kind by refusing to participate or by withdrawing from the study at any time.

VOLUNTARY CONSENT SIGNATURES

All of the above has been explained to me and all of my current questions have been answered. I understand that my participation is voluntary and that I can refuse to participate or to withdraw from the study without penalty of any kind. I also understand that I am encouraged to ask questions about any aspect of this research study during the course of this study, and that such future questions will be answered by the researcher listed on the first page of this form.

Any questions I have about my rights as a research participant will be answered by T. W. Fraser Russell, the Vice Provost for Research at the University of Delaware (302-831-4007).

By signing this form, I agree to participate in this research study. A copy of this consent form will be given to me.

Participant's Signature

Date

Witness Signature

Date

RETENTION OF AUDIO RECORDS RELEASE:

In order to fully understand why participants performed in a particular manner, audio taped records of participants explaining their decisions on each task is required. Only the principal investigator and members of her research team will have access to these records, which will be destroyed August 31, 2010. Participants may deny permission to keep audio records of their performance without penalty, and should this occur, the records will be destroyed immediately.

Please put your initials in the space below to permit retention of audio records.

_____ I also agree to allow the investigator of this study to retain audio records of my performance in the research study.

OPTIONAL ACADEMIC RECORD RELEASE:

In order to examine whether or not course grade in statistics, mathematics, and research methods differentiates between students, it would be desirable to examine students' prior academic performance in these courses within the last two or three years (depending on education level), as well as their grade for the statistics course currently being taken (i.e., during the 2002-2003 academic year). This information will be kept strictly confidential and is not required for participation in this study.

Please put your initials in the space below to permit the release of your college academic records. Only course grades and class averages in statistics, mathematics, and research methods courses will be reviewed and recorded for this study.

_____ I also agree to allow my college academic records to be released for use in this research study.

INVESTIGATOR'S CERTIFICATION

I certify that the nature and purpose, the potential benefits and possible risks associated with participation in this research study have been explained to the above individual and that any questions about this information have been answered.

Investigator's Signature

Date