STUDY 1

Consent Form

Project Description

The purpose of this study is to develop and validate a series of scales assessing people’s attitudes and beliefs regarding the domain of computer science. Your involvement in this research involves completing online surveys. The surveys should take you approximately 30 minutes to complete.

Principal Investigator

The principal investigator is Dr. Jeni Burnette. Should you have any questions or concerns, you can contact Dr. Burnette at jburnet2@richmond.edu.

Benefits and Risks of Research

The project involves no more than minimal risk to any participant. Steps will be taken to ensure that all information gathered will be held in strictest confidence. There are no direct benefits to you as a participant, other than helping with scientific research. All participants will be given a $10 Amazon gift card for their time.

Voluntary Participation

Your participation in this project is voluntary and you are free to withdraw your consent and discontinue participation in the project at any time without penalty. You are free not to answer any questions that you do not wish to answer.

Use of Information and Data Collected

Information collected in this study will be used in aggregate form only. These data will be widely disseminated through a variety of methods including publications, presentations, and data sharing.

Confidentiality of Records

In order to ensure the confidentiality of records, we are not recording any identifying information. The results will be reported in aggregate form only. Your contact information will be collected for payment purposes only; this contact information will not be associated with your survey responses.

Participant’s Rights Information

If you have any questions concerning your rights as a research participant, you may contact the Chair of the University of Richmond’s Institutional Review Board (IRB) for the Protection of Human Subjects of Research, Dr. R. Kirk Jonas, at 804-484-1565 or [rjonas@richmond.edu](mailto:rjonas@richmond.edu) for information or assistance.

Participant’s Consent

The study has been described to me and I understand that my participation is voluntary and that I am free to withdraw my consent and discontinue my participation in the project at any time without penalty.

I understand that if I have any questions or concerns about this experiment, I may pose them to Dr. Burnette at jburnet2@richmond.edu.

By clicking the box below, I attest that I am 18 years of age or older, that I have read and understand the above information and that I consent to participate in this study.

STUDY 2

Consent Form

Project Description

The purpose of this study is to examine factors that influence performance on computer science tasks. Your involvement in this research involves completing a series of computer science tasks, receiving feedback and responding to a series of questionnaires. This study should take you an hour to complete.

Principal Investigator

The principal investigator is Dr. Jeni Burnette. Should you have any questions or concerns, you can contact Dr. Burnette at jburnet2@richmond.edu.

Benefits and Risks of Research

The project involves no more than minimal risk to any participant. Steps will be taken to ensure that all information gathered will be held in strictest confidence. There are no direct benefits to you as a participant, other than helping with scientific research. Participants will either receive class credit *or* will be given $10 for their time.

Voluntary Participation

Your participation in this project is voluntary and you are free to withdraw your consent and discontinue participation in the project at any time without penalty. You are free not to answer any questions that you do not wish to answer.

Use of Information and Data Collected

Information collected in this study will be used in aggregate form only. These data will be widely disseminated through a variety of methods including publications, presentations, and data sharing.

Confidentiality of Records

In order to ensure the confidentiality of records, we are not recording any identifying information. The results will be reported in aggregate form only. Your contact information will be collected for payment purposes only; this contact information will not be associated with your survey responses.

Participant’s Rights Information

If you have any questions concerning your rights as a research participant, you may contact the Chair of the University of Richmond’s Institutional Review Board (IRB) for the Protection of Human Subjects of Research, Dr. R. Kirk Jonas, at 804-484-1565 or [rjonas@richmond.edu](mailto:rjonas@richmond.edu) for information or assistance.

Participant’s Consent

The study has been described to me and I understand that my participation is voluntary and that I am free to withdraw my consent and discontinue my participation in the project at any time without penalty.

I understand that if I have any questions or concerns about this experiment, I may pose them to Dr. Burnette at jburnet2@richmond.edu.

By clicking the box below, I attest that I am 18 years of age or older, that I have read and understand the above information and that I consent to participate in this study.

STUDY 3- PILOT

Consent Form

Project Description

The purpose of this study is to examine the role of virtual technology learning environments in the learning of computer science. Your involvement in this research involves completing a series of computer science tasks within a virtual environment as well as responding to interview and online questionnaires. This will take approximately 1 hour.

Principal Investigator

The principal investigator is Dr. Jeni Burnette. Should you have any questions or concerns, you can contact Dr. Burnette at jburnet2@richmond.edu.

Benefits and Risks of Research

The project involves no more than minimal risk to any participant. Steps will be taken to ensure that all information gathered will be held in strictest confidence. There are no direct benefits to you as a participant, other than helping with scientific research. All participants will be given $10 for their time.

Voluntary Participation

Your participation in this project is voluntary and you are free to withdraw your consent and discontinue participation in the project at any time without penalty. You are free not to answer any questions that you do not wish to answer.

Use of Information and Data Collected

Information collected in this study will be used in aggregate form only. These data will be widely disseminated through a variety of methods including publications, presentations, and data sharing.

Confidentiality of Records

In order to ensure the confidentiality of records, we are not recording any identifying information. The results will be reported in aggregate form only. Your contact information will be collected for payment purposes only; this contact information will not be associated with your survey responses.

Participant’s Rights Information

If you have any questions concerning your rights as a research participant, you may contact the Chair of the University of Richmond’s Institutional Review Board (IRB) for the Protection of Human Subjects of Research, Dr. R. Kirk Jonas, at 804-484-1565 or [rjonas@richmond.edu](mailto:rjonas@richmond.edu) for information or assistance.

Participant’s Consent

The study has been described to me and I understand that my participation is voluntary and that I am free to withdraw my consent and discontinue my participation in the project at any time without penalty.

I understand that if I have any questions or concerns about this experiment, I may pose them to Dr. Burnette at jburnet2@richmond.edu.

By clicking the box below, I attest that I am 18 years of age or older, that I have read and understand the above information and that I consent to participate in this study.

STUDY 3

Consent Form

Project Description

The purpose of this study is to examine the role of virtual technology learning environments in the learning of computer science. This study unfolds across the semester and involves answering online questionnaires at the start and end of the semester. These questionnaires will take approximately 30 minutes. In addition, you will take part in five short online exercises, which involve working with wikis focused on learning how to complete computer science tasks and engaging in virtual reality gaming activities. You will also respond to a series of self-report questionnaires at the end of each of the activities. These sessions should take approximately 15 minutes.

Principal Investigator

The principal investigator is Dr. Jeni Burnette. Should you have any questions or concerns, you can contact Dr. Burnette at jburnet2@richmond.edu.

Benefits and Risks of Research

The project involves no more than minimal risk to any participant. Steps will be taken to ensure that all information gathered will be held in strictest confidence. There are no direct benefits to you as a participant, other than helping with scientific research.

Voluntary Participation

Your participation in this project is voluntary and you are free to withdraw your consent and discontinue participation in the project at any time without penalty. You are free not to answer any questions that you do not wish to answer.

Use of Information and Data Collected

Information collected in this study will be used in aggregate form only. These data will be widely disseminated through a variety of methods including publications, presentations, and data sharing.

Confidentiality of Records

In order to ensure the confidentiality of records, we are not recording any identifying information. The results will be reported in aggregate form only. In order to match the data from this study to performance in the class, we will use a non-identifying identification number.

Participant’s Rights Information

If you have any questions concerning your rights as a research participant, you may contact the Chair of the University of Richmond’s Institutional Review Board (IRB) for the Protection of Human Subjects of Research, Dr. R. Kirk Jonas, at 804-484-1565 or [rjonas@richmond.edu](mailto:rjonas@richmond.edu) for information or assistance.

Participant’s Consent

The study has been described to me and I understand that my participation is voluntary and that I am free to withdraw my consent and discontinue my participation in the project at any time without penalty.

I understand that if I have any questions or concerns about this experiment, I may pose them to Dr. Burnette at jburnet2@richmond.edu.

By clicking the box below, I attest that I am 18 years of age or older, that I have read and understand the above information and that I consent to participate in this study.

**Measures**

Implicit theory of computer science *On a scale ranging from 1 (strongly disagree) to 6 (strongly agree)*

1. You have a certain amount of computer science ability, and you really can’t do much to

change it.

2. Your computer science ability is something about you that you can’t change very much.

3. You can learn new things, but you can’t really change your basic computer science ability.

4. Practice, hard work, effort, and persistence can change your computer science ability.

5. Your computer science ability is something that you can develop

Identity threat

*(Cheryan et al 2009); On a scale ranging from 1 (not at all) to 7 (extremely)*

If you worked at a computer science company, how much would you worry that people would draw conclusions about your gender based on your performance?

*1 (not at all) to 7 (extremely)*

How much is your gender valued in this context?

*1 (very negative) to 7 (very positive)*

How negative versus positive is the environment?

*(Cohen & Garcia 2005)On a scale ranging from 1 (strongly disagree) to 7 (strongly agree)*

When performing computer science tasks, I worry that people will draw conclusions about my gender group, based on the performances of *other* people in my gender.

When performing computer science tasks, I worry that people will draw conclusions about my gender group based on my performances.

When performing computer science tasks, I worry that people will draw conclusions about me, based on what they think about my gender group.

*{Perceived Stereotype Threat- Jimmy Louis Johnson 2012 Dissertation- The Perceived Stereotype Threat Scale (Ziegert, Ployhart, & McFarland, 2002), the Post-test Attitudes Survey (McKay, 1999), and the stereotype threat perception measure developed by Sawyer and Hollis-Sawyer (2003)}*

*On a scale ranging from 1 (strongly disagree) to 7 (strongly agree)*

People of my gender do significantly better on computer science tasks.

I think others believe that my gender determines how well I do on computer science tasks.

I actually have an advantage on computer science tasks due to my gender.

I am at a disadvantage on computer science tasks due to my gender.

The task may have been easier for people of my gender.

The experimenter expected me to do poorly on the task because of my gender.

In computer science classes, people of my gender often face biased evaluations.

I never worry that people will draw conclusions about my computer science ability based on my gender.

Computer science tasks, like the one that I just took, have been used to discriminate against people of my gender.

During the task, I wanted to show that people of my gender could perform well on it.

A negative opinion exists about how people of my gender perform on this type of task.

Sense of belonging

*(Cheryan et al 2009) On a scale ranging from 1 (not at all) to 7 (extremely)*

How much do you feel you belonged in the environment?

How similar do you feel to the people in the environment?

*(Veilleux Bates Jones Crawford Smith 2013)*

I feel that I am supported in this class.

I feel that I am a part of this class.

I feel that I am accepted in this class.

I feel comfortable in this class.

I feel that I am a part of this major.

I feel that I am supported in this major.

I feel comfortable in this major.

I feel that I am accepted in this major.

I really enjoy going to school here.

I feel like I really belong at this school.

I wish I had gone to another school instead of this one.

I wish I were at a different school.

*(Good, Rattan, Dweck, 2012)*

Today we have some questions we would like you to answer about your experience with computer science courses and in the computer science academic community. When we mention the computer science academic community, we are referring to the broad group of people involved in that field, including the students in a computer science course. We would like you to consider your membership in the computer science community. Please respond to the following statements based on how you feel about your sense of belonging within computer science and your membership in it. There are no right or wrong answers to any of these statements; we are interested in your honest reactions and opinions. Please read each statement carefully, and indicate the number that reflects your degree of agreement.

*On a scale ranging from 1 (strongly disagree) to 7 (strongly agree)*

When I am in a computer science class/setting:

I feel that I belong to the computer science community.

I consider myself a member of the computer science world.

I feel like I am part of the computer science community.

I feel a connection with the computer science community.

I feel like an outsider.

I feel accepted.

I feel respected.

I feel disregarded.

I feel valued.

I feel neglected.

I feel appreciated.

I feel excluded.

I feel like I fit in.

I feel insignificant.

I feel at ease.

I feel anxious.

I feel comfortable.

I feel tense.

I feel nervous.

I feel content.

I feel calm.

I feel inadequate.

I wish I could fade into the background and not be noticed.

I try to say as little as possible.

I enjoy being an active participant.

I wish I were invisible.

I trust the testing materials to be unbiased.

I have trust that I do not have to constantly prove myself.

I trust my instructors to be committed to helping me learn.

Even when I do poorly, I trust my instructors to have faith in my potential.

Academic fit

*(Walton Cohen 2007) 1 \_ strongly disagree, 5 \_ strongly agree;*

People in the computer science department like me

I would feel comfortable in the computer science department

People in the computer science department are a lot like me

I belong in the computer science department

Compared with most other students, I belong in the computer science department

*Cheryan et al 2013;* 1 \_ *not at all,* 7 \_ *very much*

How much do you feel like you fit in the computer science major?

How much do you enjoy using computers?

Computer science interest scale

*Savannah Benningfeld (2013) Masters thesis*

Please answer the questions below honestly; there are no right or wrong answers.

Never, Rarely, Sometimes, Most of the time, Always

1. Computer science is interesting

2. I like computer science.

3. Computer science is fun.

4. Computer science is boring.

5. Computer science is cool.

6. Learning about computer science is important.

7. Learning about computer science is helpful.

8. What I learn in computer science is useful.

9. I know a lot about computer science.

10. I am good at computer science.

11. Computer science is hard for me.

12. I do well in my computer science classes.

13. Computer science is easy for me.

14. I watch television shows about computer science outside of school.

15. I look at websites about computer science outside of school.

16. I play computer science computer games outside of school.

17. I read books about computer science outside of school.

18. I go places to learn about computer science outside of school.

19. I like to do computer science experiments outside of school.

20. Doing well in computer science is important to me.

21. Computer science is one of the most important subjects in school.

22. What I learn in computer science is more useful than what I learn in other classes.

*Cheryan et al 2013;* 1 \_ *not at all,* 7 \_ *very much*

How likely are you to major in that field?

How much have you considered majoring in that field?

Self-efficacy; *On a scale ranging from 1 (strongly disagree) to 7 (strongly agree)*

*Veilleux Bates Jones Crawford Smith 2013*

I believe I will receive excellent grades in the classes in my major.

I’m confident I can understand the most complex material presented by the instructors in the classes in my major.

I expect to do well in the classes in my major.

I’m certain I can understand the most difficult material taught in the classes in my major.

I’m confident I can do an excellent job on the assignments and tests given in the classes in my major.

*(Walton & Cohen 2007)*

I am skilled at computer science

*(Fast, Lewis, Bryant et al)*

I’m sure that I can learn everything taught in computer science

I’m sure that I can do even the hardest work in my computer science class

Even if a new topic in computer science is hard, I’m sure that I can learn it

I’m sure that I can figure out the answers to problems my teacher gives me in computer science class

Identification *On a scale ranging from 1 (strongly disagree) to 7 (strongly agree)*

*(Walton & Cohen 2007; Steele & Aronson, 1995)*

It is important to me to be good at computer science

I am good at computer science tasks

It is important to me that I do well on computer science tasks

*(Smith & White 2001; Domain Identification Measure)*

Using the following scale, please indicate the number that best describes how much you agree with each of the statements below.

I learn things quickly in computer science classes

Computer science is one of my best subjects

I get good grades in computer science

I have always done well in computer science

I’m hopeless in computer science classes

I do badly in tests of computer science

Please indicate the number that best describes you for each of the statements below using the following scale:

*Not at all, Somewhat, Very much*

How much do you value being a college student?

Do you think that academics are an important and/or necessary part of your life?

How important is it to you to do well on standardized math tests like the S.A.T?

How much do you enjoy computer science-related subjects?

How likely would you be to take a job in a computer science related field?

How much is computer science to the sense of who you are?

How important is being a student to you?

How important is it to you to be good at computer science?

Compared to other students, how good are you at computer science?

1. Very poor, 2. Poor 3. About the same 4. Better than average 5. Excellent

Potential

*(Walton & Cohen 2007)*

Rate your global “*potential* . . . to succeed in the computer science department” on a percentile

scale (10% \_ *more computer science potential than 10% of students*, 90% \_ *more potential than 90% of students*).

**Debrief: Study 2**

Dear Participant,

Thank you for completing our study. In this research we are investigating the relationship between stereotypical environments, mindsets, and performance on computer science tasks.

In this study we examined the role of exposure to stereotypical computer science environments (e.g., Star Trek poster) or not (e.g., nature poster) on people’s sense of belonging to the domain of computer science and performance on computer science tasks. Previous research has shown that exposing females to stereotypical computer science environments reduced their interest in computer science but this was not found for males (Cheryan, et al., 2009).

In addition, we are examining the role of growth mindsets in increasing belongingness and performance in the domain of computer science. Mindsets vary from a fixed mindset where people believe that “*you have a certain amount of computer science ability, and you really can’t do much to change it,*” to a growth mindset with beliefs that “*practice, hard work, effort, and persistence can change my computer science ability*.”

Because of what we are studying, we had to use minor deception in today’s study. Frist, because mindsets are especially potent after failure, we assigned all participants to receive negative feedback on the first computer science task. Thus, this feedback was not at all contingent on your actual performance. Additionally, we altered the message regarding the malleability of computer science abilities given to different participants. In the control condition, people received no message. In the growth mindset condition, participants received a message that stresses the role of effort in promoting computer science ability. In the fixed mindset condition, participants received a message that stresses ability and talent. We used this methodology because we needed to see how differences in beliefs about computer science ability influence work on computer science tasks. Thus, the research findings presented in the articles may not encapsulate the exact nature of intelligence and computer science ability. Both genes and everyday environmental and life factors contribute to intellectual aptitude including computer science ability.

We have a favor to ask you. It’s very important that nobody come into our study with any special prior knowledge. If that happens, the results of our research might be useless. Therefore, we ask you not to tell anyone about this study. Please keep what happened here confidential. We really appreciate your cooperation.

Thank you very much for your participation in our research.

**Debrief: Study 3**

Dear Participant,

Thank you for completing our study. This semester you were involved in an intervention designed to foster a growth mindset of computer science. Mindsets vary from fixed mindsets where people believe that “*you have a certain amount of computer science ability, and you really can’t do much to change it,*” to growth mindsets with beliefs that “*practice, hard work, effort, and persistence can change my computer science ability*.”

The primary goal of this research is to encourage participation and achievement of underrepresented individuals in STEM fields. Specifically, we are exploring the impact of our growth mindset intervention in the domain of computer science with the goal of increasing interest and achievement of females. Previous research has shown that having an identity that is negatively stereotyped (e.g., identity threat) in an academic context, such as women and minorities in STEM, can depress both identification with and achievement in the domain. Encouraging growth mindsets holds great promise as one mechanism through which we can increase achievement of women in STEM fields.

All students received the computer science activities. However, only half of the students received the growth mindset intervention. If you did not get information related to the growth mindset, then you were randomly assigned to the control condition. To learn more and see what students in the intervention condition received, please visit the website that contains this information at

------------- (to be completed once the address is available and design finished).

Thank you very much for your participation in our research.

**EXAMPLE RECRUITMENT MESSAGES**

Email: (Study 1)

Want to earn $10?

            Do you want to earn $10 for 30 minutes of your time? If you are currently an undergraduate student and would like a guaranteed $10 for participating in a 30-minute study, please click the link (inserted once developed) in this message (or copy it to your browser) to get more information about this online study. If you should have any questions, please email the research team at [mindsetsmatter@gmail.com](mailto:mindsetsmatter@gmail.com)

Spiderbytes (Study 2)

“Earn $10 by participating in a 45 minute study on computer gaming. Study includes brief online questionnaires, a reading task and a computer task. Participation is voluntary and confidential. Email our research team at [mindsetsmatter@gmail.com](mailto:mindsetsmatter@gmail.com) to schedule a time.

Flyer:

Want to make $10 exploring virtual reality?

Of course you do!

Email our research team at [mindsetsmatter@gmail.com](mailto:mindsetsmatter@gmail.com) to schedule a session.