Pilot WDQ-URE and Outcomes Survey -Ver.1

The survey has four sections:
   I. Characteristics of undergraduate research experience (URE)
   II. Work-Design Questionnaire for URE
   III. Outcomes of URE participation
   IV. Demographic and institutional characteristics.

You may find that some prompts in the survey appear very similar to each other. It is not a mistake, but an important part of research methodology that contributes to reliability and consistency. Thank you for your patience! If for any reason you prefer not to answer some questions, please choose the “Prefer not to say” option.

I. Characteristics of undergraduate research experience

Think about your current or recent undergraduate research experience during the academic year (not summer!) This section asks you about your research group, research setting, and the time commitments during your academic-year research experience.

1. What is the primary discipline of your research?
Response options:
   Agriculture
   Bioinformatics and/or computational biology
   Discipline-based education research (DBER)
   Engineering
   Computer science and computer engineering
   Engineering - Biomedical
   Engineering (other)
   Environmental science
   Kinesiology
   Life sciences:
   anatomy and physiology
   biochemistry
   general biology
   botany
   ecology
   evolution
   genetics
   zoology
   Marine science
   Mathematics
Neuroscience
Physical Sciences:
  Astronomy
  Chemistry
  Physics
  Geology
  Soil science
Statistics and/or Data Science
Other [text entry]
prefer not to say

2. How many undergraduate students, including yourself, are/were in your research group at the time of your participation?
[Response options:
  1
  2-4 students
  5-8 students
  9-12 students
  more than 12 students
  prefer not to say]

3. How many people in total were in your research group?
[Response options:
  2
  3-5
  6-9
  10-13
  More than 13
  prefer not to say]

4. Who was primarily responsible for mentoring and expert advice related to your research?
Mentor Definitions:
  A faculty member is a person holding an advanced degree such as Ph.D. or Ed.D. and a job at the college or university.
  A postdoctoral researcher is a person holding an advanced degree such as Ph.D. or Ed.D and continuing their training.
  Graduate students, technicians, or staff scientists are people who are invested in the research project and are not holding a doctoral degree.
  Other: a consultant is a person who was not invested in the project, but possesses relevant expertise.

[Response options:
  Faculty member
  Postdoctoral researcher]
Graduate student, technician, or staff scientist
Other
prefer not to say]

5. What was the primary setting for your research?
   Work setting Definitions:
   Laboratory research: activities in a space dedicated to conducting experiments and observations to collect data.
   Fieldwork: activities that involve observations and data collection in the natural environment. This includes classroom observations for education research.
   Computational work: collecting data using remote instrumentation (e.g. satellite, telescope) or simulation and modeling software; data analysis for the data generated in the lab or in the field.
   Collecting data in the lab or in the field with the use of computers contributes towards lab or field research.

   [Response options:
    Laboratory research
    Field research
    Computer-based research
    prefer not to say]

6. Approximately how was your research time distributed between settings?
   [response options: boxes with numeric values for each of the settings below; 3 settings should add up to 100%]
   Laboratory research
   Field research
   Computer-based research
   prefer not to say]

   The time investment and other commitments

   7. The next set of questions is focused on your most recent research experience during the academic year (not a summer term). Please, estimate your average weekly time commitment for various activities during the academic term.

   [Response options for questions 7.1-7.5:
   0 hours a week
   1 - 5 hours a week
   6 - 10 hours a week
   11 - 15 hours a week
   16 - 20 hours a week
   21 - 25 hours a week
   26 - 30 hours a week
   more than 30 hours a week]
Prefer not to say]

7.1. How many hours per week did you work on research-related activities in your most recent research experience?

7.2. During the same time period, how many hours per week did you devote to extracurricular activities (such as clubs, volunteering, sports, music or theater, other hobbies)?

7.3. During the same time period, how many hours per week did you work in a paid job unrelated to your research (on campus or off campus).

7.4. During the same time period, how many hours per week did you devote to other commitments or obligations that were not listed above? (e.g. caring for family members, unpaid work in a family business).

7.5. During the same time period, what was your status in terms of academic courses or units?
   Enrolled as a full-time student
   Enrolled as a part-time student

II. Work-design Questionnaire for Undergraduate Research Experience (WDQ-URE)

This section of the survey asks about your experience of different aspects of work in an undergraduate research group lead by a faculty mentor ("group leader") during academic year. The term "research position" encompasses work as an unpaid volunteer, as a student receiving credit for research or independent study, or as a paid research assistant.

Please, indicate how much you agree with the statements below based on your experience as an undergraduate researcher. If for any reason you prefer not to say, please choose the "Prefer not to say" option.

[Response options: strongly disagree, disagree, neither agree nor disagree, agree, strongly agree, prefer not to say]

Task Characteristics

Autonomy

Work Scheduling Autonomy
1. The research position allows me to make my own decisions about how to schedule my work.
2. The research position allows me to decide on the order in which things are done.
3. The research position allows me to plan how I do my work.

Decision-Making Autonomy
1. The research position gives me a chance to use my personal initiative or judgment in carrying out the work.
2. The research position allows me to make a lot of decisions on my own.
3. The research position provides me with significant autonomy in making decisions.

**Work Methods Autonomy**
1. The research position allows me to make decisions about what methods I use to complete my work.
2. The research position gives me considerable opportunity for independence and freedom in how I do the work.
3. The research position allows me to decide on my own how to go about doing my work.

**Task Variety**
1. The research position involves a great deal of task variety.
2. The research position involves doing a number of different things.
3. The research position requires the performance of a wide range of tasks.
4. The research position involves performing a variety of tasks.

**Task Significance**
1. The results of my work are likely to significantly affect the lives of other people.
2. The research position itself is very significant and important in the broader scheme of things.
3. The research position has a large impact on people outside the organization.
4. The work performed in the research position has a significant impact on people outside my research group.

**Task Identity**
1. The research position involves completing a piece of work that has an obvious beginning and end.
2. The research position is arranged so that I can do an entire piece of work from beginning to end.
3. The research position provides me the chance to completely finish the pieces of work I begin.
4. The research position allows me to complete work I start.

**Feedback From Job**
1. The work activities themselves provide direct and clear information about the effectiveness (e.g., quality and quantity) of my performance.
2. The research position itself provides feedback on my performance.
3. The research position itself provides me with information about my performance.

**Knowledge Characteristics**

**Job Complexity**
1. The research position requires that I only do one task or activity at a time.
2. The tasks of the research position are simple and uncomplicated.
3. The research position comprises relatively uncomplicated tasks.
4. The research position involves performing relatively simple tasks.

**Information Processing**

1. The research position requires me to monitor a great deal of information.
2. The research position requires that I engage in a large amount of thinking.
3. The research position requires me to keep track of more than one thing at a time.
4. The research position requires me to analyze a lot of information.

**Problem Solving**

1. The research position involves solving problems that have no obvious correct answer.
2. The research position requires me to be creative.
3. The research position often involves dealing with problems that I have not met before.
4. The research position requires unique ideas or solutions to problems.

**Skill Variety**

1. The research position requires a variety of skills.
2. The research position requires me to utilize a variety of different skills in order to complete the work.
3. The research position requires me to use a number of complex or high-level skills.
4. The research position requires the use of a number of skills.

**Specialization**

1. The research position is highly specialized in terms of purpose, tasks, or activities.
2. The tools, procedures, materials, and so forth used in this research position are highly specialized in terms of purpose.
3. The research position requires very specialized knowledge and skills.
4. The research position requires a depth of knowledge and expertise.

**Social Characteristics**

**Social Support**

1. I have the opportunity to develop close friendships in this research position.
2. I have the chance in this research position to get to know other people.
3. I have the opportunity to meet with others in this research position.
4. My group leader is concerned about the welfare of the people in the research group.
5. People I work with take a personal interest in me.
6. People I work with are friendly.

**Interdependence**

**Initiated Interdependence**

1. The research position requires me to accomplish my work before others complete their work.
2. Other jobs depend directly on my job.
3. Unless my job gets done, other jobs cannot be completed.

Received Interdependence
1. My research activities are greatly affected by the work of other people.
2. The research project depends on the work of many different people for its completion.
3. My work cannot be done unless others do their work.

Interaction Outside Research Group
1. The research position requires spending a great deal of time with people outside my research group.
2. The research position involves interaction with people who are not members of my research group.
3. In this research position, I frequently communicate with people who do not work in the same research group as I do.
4. The research position involves a great deal of interaction with people outside my research group.

Feedback From Others
1. I receive a great deal of information from my project leader and peers about my work performance.
2. Other people in the research group, such as group leader and peers, provide information about the effectiveness (e.g., quality and quantity) of my work performance.
3. I receive feedback on my performance from other people in my group (such as my project leader or peers).

Alternative block to separate peers and leader feedback:
Faculty/project leader feedback
1. I receive a great deal of information from my group leader about my work performance.
2. My group leader provides information about the effectiveness (e.g., quality and quantity) of my work performance.
3. I receive feedback on my performance from my group leader.

Peer feedback
4. I receive a great deal of information from other students in my group about my work performance.
5. Other students in the research group provide information about the effectiveness (e.g., quality and quantity) of my work performance.
6. I receive feedback on my performance from other students in my group.

Work Context

Ergonomics
1. The seating arrangements in my research space are adequate (e.g., ample opportunities to sit, comfortable chairs, good postural support).
2. The research space allows for all size differences between people in terms of clearance, reach, eye height, legroom, etc.
3. The research position involves excessive reaching.

Physical Demands
1. The research position requires a great deal of muscular endurance.
2. The research position requires a great deal of muscular strength.
3. The research position requires a lot of physical effort.

Work Conditions
1. The research space is free from excessive noise.
2. The climate in the research space is comfortable in terms of temperature and humidity.
3. The research position has a low risk of accident.
4. The research position takes place in an environment free from health hazards (e.g., chemicals, fumes, etc.).
5. The research position occurs in a clean environment.

Equipment Use
1. The research position involves the use of a variety of different equipment.
2. The research position involves the use of complex equipment or technology.
3. A lot of time was required to learn the equipment used in the research position.

III. Outcomes of undergraduate research participation
This section of the survey asks you to think about the outcomes of your participation in research. You may find that some prompts appear very similar to each other or even redundant. It’s not an oversight, but an important part of research methodology that contributes to reliability and consistency. Thank you for your patience.

Overall satisfaction
1. Please, indicate your overall satisfaction with your experience in the undergraduate research position:
   [response options: strongly disagree, disagree, neither agree nor disagree, agree, strongly agree, prefer not to say]
   Considering everything, I am satisfied with my experience.

Benefits of undergraduate research
In this section of the survey, you will be asked to consider a variety of possible benefits you may have gained from your research experience. If for any reason you prefer not to answer, or consider the question irrelevant to you, please choose the "Not Applicable or Prefer not to say" option.

[Response Options: small gain, moderate gain, large gain, very large gain, not applicable, prefer not to say]
2.1. Clarification of a career path
2.2. Skill in the interpretation of results
2.3. Tolerance for obstacles faced in the research process
2.4. Readiness for more demanding research
2.5. Understanding how knowledge is constructed
2.6. Understanding of the research process in your field
2.7. Ability to integrate theory and practice
2.8. Understanding of how scientists work on real problems
2.9. Understanding that scientific assertions require supporting evidence
2.10. Understanding science
2.11. Ability to analyze data and other
2.12. Learning ethical conduct in your field
2.13. Learning laboratory techniques
2.14. Ability to read and understand primary literature
2.15. Skill in how to give an effective oral presentation
2.16. Skill in science writing
2.17. Self-confidence
2.18. Understanding of how scientists think
2.19. Learning to work independently
2.20. Becoming part of a learning community
2.21. Confidence in my potential to be a teacher of science
2.22. Select the picture that best describes the current overlap of the image you have of yourself and your image of what a STEM professional is.
(STEM = science, technology, engineering, and mathematics)

Gains in THINKING AND WORKING LIKE A SCIENTIST: APPLICATION OF KNOWLEDGE TO RESEARCH WORK.

3.1. How much did you GAIN in the following areas as a result of your most recent research experience?
[Response options: no gains, a little gain, moderate gain, good gain, great gain, not applicable, prefer not to say]

1.1 Analyzing data for patterns.
1.2 Figuring out the next step in a research project.
1.3 Problem-solving in general.
1.4 Formulating a research question that could be answered with data.
1.5 Identifying limitations of research methods and designs.
1.6 Understanding the theory and concepts guiding my research project.
1.7 Understanding the connections among scientific disciplines.
1.8 Understanding the relevance of research to my coursework.

PERSONAL GAINS RELATED TO RESEARCH WORK
3.2. How much did you GAIN in the following areas as a result of your most recent research experience?
[Response options: no gains, a little gain, moderate gain, good gain, great gain, not applicable, prefer not to say]

2.1 Confidence in my ability to contribute to science.
2.2 Comfort in discussing scientific concepts with others.
2.3 Comfort in working collaboratively with others.
2.4 Confidence in my ability to do well in future science courses.
2.5 Ability to work independently.
2.6 Developing patience with the slow pace of research.
2.7 Understanding what everyday research work is like.
2.8 Taking greater care in conducting procedures in the lab or field.

Gains in SKILLS
3.3. How much did you GAIN in the following areas as a result of your most recent research experience?
[Response options: no gains, a little gain, moderate gain, good gain, great gain, not applicable, prefer not to say]

3.1 Writing scientific reports or papers.
3.2 Making oral presentations.
3.3 Defending an argument when asked questions.
3.4 Explaining my project to people outside my field.
3.5 Preparing a scientific poster.
3.6 Keeping a detailed lab notebook.
3.7 Conducting observations in the lab or field.
3.8 Using statistics to analyze data.
3.9 Calibrating instruments needed for measurement.
3.10 Working with computers.
3.11 Understanding journal articles.
3.12 Conducting database or internet searches.
3.13 Managing my time.
The following questions ask about your overall research experience and about any changes in your attitudes or behaviors as a researcher.

3.4. During your research experience HOW MUCH did you:
[Response options: none, a little, some, a fair amount, a great deal, not applicable, prefer not to say]

- 4.1 Engage in real-world science research
- 4.2 Feel like a scientist.
- 4.3 Think creatively about the project.
- 4.4 Try out new ideas or procedures on your own.
- 4.5 Feel responsible for the project.
- 4.6 Work extra hours because you were excited about the research.
- 4.7 Interact with scientists from outside your school.
- 4.8 Feel a part of a scientific community.

Research experience and accomplishments
3.5. As part of my most recent research experience... yes no

- 5.1 I presented a talk or poster to other students or faculty
- 5.2 I presented a talk or poster at a professional conference
- 5.3 I attended a conference
- 5.4 I wrote or co-wrote a paper that was published in an academic journal
- 5.5 I wrote or co-wrote a paper that was published in an undergraduate research journal
- 5.6 I will present a talk or poster to other students and faculty
- 5.7 I will present a talk or poster at a professional conference
- 5.8 I will write or co-write a paper to be published in an academic journal.
- 5.9 I will write or co-write a paper to be published in an undergraduate research journal.
- 5.10 I won an award or scholarship based on my research

Research experience
3.6. Rate how much you agree with the following statements.
[Response options: Strongly disagree, Disagree, neither agree nor disagree, agree, strongly agree, not applicable, prefer not to say]

- 6.1 Doing research confirmed my interest in my field of study.
- 6.2 Doing research clarified for me which field of study I want to pursue.
- 6.3 My research experience has prepared me for advanced coursework or thesis work
- 6.4 My research experience has prepared me for graduate school.
- 6.5 My research experience has prepared me for a job

IV. Demographics and institutional context.

We hope that the results of our survey will ultimately help make STEM research experiences work better for all students from a wide variety of institutions, backgrounds, and identities. We ask for demographic information below to help us towards this goal. If for any reason you do not wish to answer a question, please select the “Prefer not to answer” option.
1. What is your current academic year in college?
   - First-year
   - Second-year
   - Third-year
   - Fourth-year
   - Fifth-year or higher
   - Graduate student
   - Prefer not to say

2. In which discipline are you currently pursuing a degree? Which discipline best aligns with your major?
   - Agriculture
   - Chemistry
   - Computer science
   - Environmental sciences
   - Engineering
   - Education and Social sciences
   - Life sciences (including biology and related fields)
   - Mathematics or Statistics
   - Physics
   - Other (please, specify) (Short answer _______)
   - Prefer not to say

3. How much experience do you have with undergraduate research during the academic year (not including summer)?
   If you have participated in multiple projects, please estimate total experience for all projects.
   I completed…
   - [response options:
     - Part of an academic year
     - One academic year
     - Two academic years
     - Three academic years
     - More than 3 academic years
     - Prefer not to say]

4. How many times have you participated in SUMMER research?
   [Response options:
   - Never participated
   - 1 summer
   - 2 summers
   - 3 summers or more]
5. Are you a first-generation college student?
   A. Yes
   B. No
   C. Prefer not to say

6. What gender do you identify as?
   Female
   Male
   Non-binary
   Trans-gender
   Prefer not to say
   Other __________

7. Please specify your race.
   American Indian or Alaska Native
   Asian
   Black or African American
   Native Hawaiian or Other Pacific Islander
   White
   Prefer not to say

8. Please specify your ethnicity.
   Hispanic or Latino
   Not Hispanic or Latino
   Prefer not to say

9. What is your age?
   A. 18 to 20
   B. 21 to 25
   C. 26 to 30
   D. 31 to 35
   E. Over 35
   F. Prefer not to say

The last group of questions is about the college or university you are attending.

10. Which statement best describes the college or university you are attending?
 [response options in two columns:
   2-year institutions:
   2-year, very small (fewer than 500 students)
11. What type of degrees does your college or university primarily award?
   - 2-year degrees
   - 4-year degrees only
   - 4-year degrees primarily and some Masters degrees
   - Primarily graduate degrees, with some 4-year degrees
   - Prefer not to say

12. What type of college or university are you currently attending?
   - Public
   - Private, not-for-profit
   - Private, for-profit
   - Prefer not to say

13. In which state or territory is your college or university located?
   [response options: US states and territories AND “prefer not to say”]

Debriefing statement

You have reached the end of the survey! Thank you for your participation!
Your honest and thoughtful responses will help us better understand how different features and structure of work help generate positive outcomes of the undergraduate research experiences.

If you wish to be informed of the results of this study once the data analysis is concluded, please, provide your email address, and you will receive a digital copy of a summary report or a publication [enter here].

A small number of participants may be invited to elaborate on their experiences in an interview. If you are interested in receiving an invitation for an interview, please provide your email address [enter here].
The next page will take you to the Tango Card site, where you will be able to choose an e-gift card for $5 as a token of our appreciation for your participation in the study.