**Self-Assessment Survey for “Early Exposure to Research” Activities**

**Background**

We designed two student self-assessment surveys to quantify the impact of our early exposure activities on student motivation for research, participation in research, and integration of entrepreneurial mindset (EM) in research. The first survey (post-survey) is intended to be conducted immediately after the completion of the activities. The second survey (follow-up survey) should be distributed one year after the post-survey to assess whether students started undergraduate research and what types of deliverables or outcomes they generated from their research.

The surveys are based on a retrospective gains design and integrate subsets of questions from the Undergraduate Research Student Self-Assessment (URSSA) [1] and Intrinsic Motivation Inventory (IMI) [2], along with new questions designed by the research team to explore student growth in areas linked to EM. The key questions we aimed to address through our survey data collection are summarized in Table 1.

Additional details on our use of this assessment can be found in our ASEE conference paper [3].

**Table 1:** Key questions our group aimed to explore through student self-assessment surveys, mapped to specific survey questions.

|  |  |  |
| --- | --- | --- |
| Question | Post-survey section | Follow-up survey section |
| *Do students participating in early exposure activities…* |  |  |
| Report changes in their interest in, understanding of, or awareness of research? | Q1 | Q8 |
| Show increased motivation to start or continue undergraduate research? | Q2-3 | Q6 – Q7 |
| Show increased ability to relate the 3C’s to research? |  | Q8 |
| Start an undergraduate research project more frequently? |  | Q1 – Q5 |
| Stay involved in undergraduate research longer and/or spend more hours doing research? |  | Q1 – Q5 |
| Disseminate their research results more widely or frequently? |  | Q9 |

**References**

[1] T. J. Weston and S. L. Laursen, “The undergraduate research student self-assessment (URSSA): Validation for use in program evaluation,” *CBE—Life Sciences Education*, vol. 14, no. 3, p. ar33, 2015.

[2] R. M. Ryan and E. L. Deci, “Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions,” *Contemp Educ Psychol*, vol. 25, no. 1, Jan. 2000, doi:10.1006/ceps.1999.1020.

[3] J. Peponis, M.L. Benton, K.W. Van Treuren, B.E. Johnson, L. Liu, A.M. Jacobi, “Work-In-Progress: Early Student Exposure to an Entrepreneurial Mindset in Engineering Research”. *2023 ASEE Annual Conference Proceedings*, June 2023.

**Post-survey for Early Exposure to Research Activities**

This post-survey should be administered immediately after completion of the course or workshop that integrated the early exposure to research activities.

\* = optional question

**Instructions to students:** Answer the following questions based on your experience in the course or workshop where the instructor sent you this link.

**Gains in skills/mindsets relevant to research**

1. How much did you GAIN in the following areas as a result of participating in the activities in this course?

*Question source: Team discussion, URSSA “Thinking and working like a scientist” items*

*Response options: Slider of 0-4 with the following text: No gains (0), a little gain (1), moderate gain (2), good gain (3), great gain (4), not applicable*

1. Ability to explain the process of research
2. Ability to describe the impact of research in society
3. Ability to make connections between research topics and my coursework
4. Confidence in contacting a faculty member or supervisor to express interest in a given research topic or project.
5. Recognition of the connections among engineering and scientific disciplines
6. Insight into the types of research going on at my university
7. Enthusiasm about pursuing research on a topic I’m interested in.
8. Confidence in my ability to persuade a colleague that a discovery adds value in multiple ways (value could be technological, societal, financial, environmental, etc.)

**Motivation and future plans**

1. Compared to your intentions BEFORE taking this course, HOW LIKELY ARE YOU NOW to:

*Question source: Expanded version of URSSA future plans question*

*Response options: less likely, not more likely, a little more likely, somewhat more likely, extremely more likely, not applicable (could also be slider if desired)*

1. Contact a professor about an advertised undergraduate research project
2. Contact a professor with an idea for a new research project
3. Apply for a summer undergraduate research program
4. Apply for an academic year undergraduate research program
5. Apply for an industry internship or position focused on research
6. Participate in an entrepreneurship program on campus for developing a business idea
7. Apply for an internship or position with a start-up company
8. Apply to a master’s degree or professional degree program
9. Apply to a PhD program

1. If you are considering starting an undergraduate research project, what is your motivation to do undergraduate research? I WOULD LIKE TO DO RESEARCH TO: (rank your top three motivations)

*Question source: URSSA, reframed from yes/no to top choices*

*Response options: rank top three + free response if other, also need a response option to decline to rank, e.g. “not interested in undergraduate research”*

1. Explore my interest in STEM
2. Gain hands-on experience in my field of interest
3. Clarify which field I want to study
4. Clarify whether I want to pursue a career in research
5. Have a good intellectual challenge
6. Work with a particular faculty member
7. Participate in a program with a strong reputation
8. Get good letters of recommendation
9. Enhance my resume
10. Make an impact on the world
11. Not interested in research
12. Other [free response]

**Workshop/activity feedback**

1. How much did the following activities support your learning and success in research?

*Question source: Modified from URSSA*

*Response options: did not do this activity, not at all, a little, a good amount, a great deal*

1. Research reflection
2. Researcher interview
3. Why Do Research reflection
4. Exploring opportunities
5. Technology in daily life
6. Find a grant program
7. Research opportunity bingo
8. Of the activities / assignments related to engineering research, which did you find most enjoyable? Please share any feedback or suggestions you have about these activities.

*Response options: Free response*

**Demographics and previous research experience**

1. What university do you attend? *(Drop down menu)*
2. Select the course section you are currently attending with the instructor you sent you this link. *(Drop down menu with available courses)*
3. \*What is your current class year? *(Response options: 1st year, 2nd year, 3rd year, 4th year or more)*
4. \*What is your major? *(Drop down response)*
5. Prior to this term, have you previously participated in a science, technology, engineering, or mathematics (STEM) research experience? *(yes/no)*
6. \*If yes to 9, please describe briefly below: *(Free response)*
7. \*If yes to 9, What was the duration of your longest research experience? *(one semester/quarter, one summer, one year, longer than one year)*
8. \*Is there any aspect of your identity that is important to you as a STEM student? *(free response)*

**Follow-up Survey for Early Exposure to Research Activities**

This survey should be sent to the same group of students one year after the post-survey above.

**Instructions to students:** Answer the following questions based on your experience in the course where the instructor sent you this link.

**Current Research Experience**

1. In the last year, have you done any of the following?

*Response options: yes/no*

* 1. Contacted a faculty member regarding available undergraduate research projects
  2. Utilized campus resources, such as an Office of Undergraduate Research Programs or Career Services, to learn about opportunities for undergraduate research
  3. Applied for a competitive undergraduate research program, such as a summer REU program
  4. Applied for an industry internship position focusing on research
  5. Attended an on-campus research seminar or symposium

1. In the last year, have you been actively involved in a STEM undergraduate research project or program? *(Response options: yes, no)*

If the student answers yes to 3, then continue with questions 6-9. Otherwise, skip to demographic questions at the end.

1. \*Please describe below: *(Free response)*
2. \*In the last year, approximately how many hours per week did you work at research-related activities during the summer? *(0-10, 10-20, 20+)*
3. \*In the last year, approximately how many hours per week did you work at research-related activities during the academic year? *(0-5, 5-10, 10+ )*

**Motivation**

1. What motivated you to do research? I WANTED TO DO RESEARCH TO: (rank your top three motivations)

*Question source: URSSA, reframed from yes/no to top choices*

*Response options: rank top three + free response if other*

1. Explore my interest in STEM
2. Gain hands-on experience in my field of interest
3. Clarify which field I wanted to study
4. Clarify whether I wanted to pursue a career in research
5. Have a good intellectual challenge
6. Work with a particular faculty member
7. Participate in a program with a strong reputation
8. Get good letters of recommendation
9. Enhance my resume
10. Make an impact on the world
11. Other [free response]
12. For each of the following statements, please indicate how true it is for you using the following scale

*Question source: Intrinsic Motivation Inventory*

*Response options: Slider 0 = not at all true to 4 = very true*

* 1. I enjoyed undergraduate research.
  2. I think I did well at research, compared to other students.
  3. I did not put much energy into research.
  4. I am satisfied with my performance as an undergraduate researcher.
  5. I felt very tense while doing research.
  6. I felt like I didn’t really have any control over my project as an undergraduate researcher.
  7. I felt like I could really trust my immediate mentor.
  8. I would be willing to do undergraduate research again because it has some value to me.

**Gains in skills/mindsets related to research**

1. \*How much did you GAIN in the following areas as a result of participating in undergraduate research?

*Question source: Team’s review of EM-related metrics from KEEN*

*Response options: Slider of 0-4 with the following text: No gains (0), a little gain (1), moderate gain (2), good gain (3), great gain (4), not applicable*

1. Ability to explain the process of research
2. Ability to describe the impact of research in society
3. Ability to make connections between research topics and my coursework
4. Recognition of the connections among engineering and scientific disciplines
5. Insight into the types of research going on at my university
6. Enthusiasm about pursuing research on a topic I’m interested in
7. Confidence in my ability to persuade a colleague that a discovery adds value in multiple ways (value could be technological, societal, financial, environmental, etc.)
8. Ability to recognize and explore knowledge gaps
9. Ability to gather data to support and refute ideas
10. Ability to take ownership of a project
11. Ability to identify and evaluate sources of information
12. Development of a professional network

**Research dissemination and application**

9. Which of the following activities did you complete as part of your most recent research experience? (Check all applicable boxes below.)

*Question source: URSSA dissemination question with additional options*

*Response options: check boxes to select activities, plus text box for Other option if checked*

1. I presented a talk or poster to other students or faculty at my university.
2. I attended an external conference.
3. I presented a talk or poster at an external conference.
4. I wrote a thesis or research report on my work.
5. I wrote or co-wrote a conference paper.
6. I wrote or co-wrote a paper that was submitted to an undergraduate research journal.
7. I wrote or co-wrote a paper that was submitted to a peer-reviewed academic journal.
8. I won an award or scholarship based on my research.
9. I participated in an entrepreneurship competition or idea accelerator program related to my research.
10. I presented my research to the broader community (e.g. museum or K-12 outreach programs).
11. I trained or mentored other undergraduate researchers.
12. I collaborated with students or faculty outside of my primary laboratory group as part of my research.
13. Other (please specify):

**Demographics**

1. What university do you attend? *(Drop down menu)*
2. Select the course section you attended **last year** with the instructor you sent you this link. *(Drop down menu with available courses)*
3. \*What is your current class year? *(Response options: 1st year, 2nd year, 3rd year, 4th year or more)*
4. \*What is your major? *(Drop down response)*
5. \*Is there any aspect of your identity that is important to you as a STEM student? *(free response)*