**Self-Assessment Survey for Student Research Training Workshops**

**Background**

We designed two student self-assessment surveys to quantify the impact of our research training workshops on student research skills, research outcomes, motivation, and integration of entrepreneurial mindset (EM) in research. The first survey (post-survey) is intended to be taken immediately after the completion of the training workshops or after the completion of the research experience that integrates those workshops. The second survey (follow-up survey) should be distributed one year after the post-survey to assess whether students continued to do undergraduate research and what types of deliverables or outcomes they generated from their research.

The post-survey is based on a retrospective gains design and integrates 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 (e.g. “Ability to explain the needs or motivations of various stakeholders”). The follow-up survey focuses on continuing student motivation as well as time spent on research, generation of research deliverables, and future plans. 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 training workshops during their research experience…* |  |  |
| Stay involved in undergraduate research longer and/or spend more hours doing research? |  | **Q1 – Q4** |
| Disseminate their research results more widely or frequently? | **Q14** | **Q9** |
| Incorporate aspects of EM into their motivation for research and future plans? | **Q10-13** | **Q6-8** |
| Show increased ability to relate the 3C’s to research? | **Q6** |  |
| Show increased gains in thinking and working like a scientist or engineer? | **Q5** |  |
| Show increased confidence and personal gains related to research? | **Q5** |  |
| Show positive changes in attitudes or behaviors related to research? | **Q7** |  |
| Find value in the workshop material? | **Q15** |  |

**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] Nezafati, M., Reizman, I., Marincel Payne, M., Liu, L. Development of entrepreneurial mindset-driven training materials for undergraduate researchers. *2023 ASEE Annual Conference Proceedings*, June 2023, <https://peer.asee.org/43158>.

**Post-survey for Student Research Training Workshops**

This post survey should be administered immediately after completion of the research experience / term that included the student research training workshops. In our work, it was also distributed to a baseline group of students who completed similar research experiences but did not complete our student research training workshops.

\* = optional question

**Research experience**

1. Including this term, how many semesters (or quarters, if applicable for your university) have you been involved in undergraduate research during the academic year? *(Response options: 0, 1 semester, 2 semesters, 3 or more semesters, 1 quarter, 2 quarters, 3 quarters, 4 or more quarters)*
2. Including this term, how many times have you participated in summer undergraduate research? *(Response options: 0, 1 summer, 2 summers, 3 or more summers)*
3. \*Including this term, what was the duration of your longest research experience working with a single research group? *(Free response)*
4. \*Approximately how many hours per week did you work at research-related activities in your research experiences? *(Free response)*

**Gains in attitudes or mindsets related to research**

1. How much did you GAIN in the following areas as a result of your most recent research experience?

*Question source: URSSA “Thinking and working like a scientist” and “Personal gains related to research”*

*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. Analyzing data for patterns
2. Figuring out the next step in a research project
3. Formulating a research question that could be answered with data
4. Understanding the theory and concepts guiding a research project I am working on
5. Understanding the connections among scientific and engineering disciplines
6. Understanding the relevance of research to my coursework
7. Comfort in working collaboratively with others.
8. Ability to work independently
9. Ability to describe what everyday research work is like
10. 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 explore knowledge gaps
2. Ability to gather data to support and refute ideas
3. Ability to take ownership of research on a topic of interest
4. Ability to evaluate sources of information
5. Confidence in my ability to persuade a colleague that a discovery adds value in multiple ways (value could be technological, societal, financial, environmental, etc.)
6. Ability to modify an idea, experiment, or product based on feedback
7. Ability to describe how a discovery could be scaled or sustained, using elements such as revenue streams, key partners, costs, and key resources
8. Ability to explain the needs or motivations of various stakeholders
9. During your research experience HOW MUCH did you:

*Question source: URSSA “Changes in attitudes or behaviors”*

*Response options: None, a little, some, a fair amount, a great deal, not applicable*

* 1. Think creatively about your project
  2. Try out new ideas or procedures on your own
  3. Feel responsible for your project
  4. Work extra hours because you were excited about the research
  5. Interact with researchers from outside your school
  6. Feel a part of the scientific and engineering community

**Gains in skills related to research**

1. How much did you GAIN in the following areas as a result of your most recent research experience?

*Question source: URSSA “Skills” list edited to focus on skills most relevant to EML*

*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. Making oral presentations
2. Conveying my findings visually in graphics, posters, or presentation slides
3. Writing scientific reports or papers
4. Defending an argument when asked questions
5. Explaining my project to people outside my field
6. Documenting my work for future researchers in the laboratory
7. Setting goals to make progress in my research

**Motivation, overall research experience, and future plans**

1. \*Please rate the following:

*Question source: URSSA*

*Response options: Poor, fair, good, excellent, not applicable*

1. My working relationship with my research mentor
2. My working relationship with research group members or other students on this project
3. The research experience overall
4. \*Rate how much you agree with the following statements:

*Question source: URSSA*

*Response options: Strongly disagree, disagree, agree, strongly agree*

1. Doing research confirmed my interest in my field of study
2. Doing research clarified for me which field of study I want to pursue
3. My research experience has prepared me for graduate school
4. My research experience has prepared me for a job
5. My research experience has prepared me for entrepreneurial activities
6. 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 three choices for motivation*

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

1. Explore my interest in science / engineering
2. Gain hands-on experience in research
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: 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.

1. Compared to your intentions BEFORE doing research, 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*

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

**Research dissemination and application**

1. 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):

**Workshop / activity feedback**

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

*Question source: List of research training workshops created by team*

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

1. Framing your research question with entrepreneurial mindset
2. Thriving in a research environment (setting SMART goals)
3. Building resilience in research
4. Developing your research pitch
5. Data visualization
6. Maximizing the impact of your research
7. Which aspect of the workshops did you find most helpful? *(Free response)*
8. Please list one suggestion for improving the workshops. *(Free response)*

**Demographics**

1. What university do you attend? *(Drop down response)*
2. \*What is your current class year? *(Response options: 1st year, 2nd year, 3rd year, 4th year or more)*
3. \*What is your primary major? *(Drop down response options relevant to each program)*
4. \*Is there any aspect of your identity that is important to you as a STEM student? *(free response)*

**Follow-up Survey for Student Research Training Workshops**

This survey should be sent to the same group of students one year after the post-survey above. In our work, it was also distributed to a baseline group of students who completed similar research experiences but did not complete our student research training workshops.

\* = optional question

**Current research experience**

1. Including this term, how many semesters (or quarters, if applicable for your university) have you been involved in undergraduate research during the academic year? *(Response options: 0, 1 semester, 2 semesters, 3 or more semesters, 1 quarter, 2 quarters, 3 quarters, 4 or more quarters)*
2. Including this term, how many times have you participated in summer undergraduate research? *(Response options: 0, 1 summer, 2 summers, 3 or more summers)*
3. \*Including this term, what was the duration of your longest research experience working with a single research group? *(Free response)*
4. \*Approximately how many hours per week did you work at research-related activities in your research experiences? *(Free response)*

**Motivation and future plans**

1. Are you currently involved in undergraduate research? *(Response options: yes, no)*
2. If yes to 5, what motivated you to continue to do research? I CONTINUED RESEARCH TO: (rank your top three motivations)

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

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

1. Explore my interest in science / engineering
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: 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
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8. I would be willing to do undergraduate research again because it has some value to me
9. Compared to your intentions BEFORE starting undergraduate research, 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*

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

**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 response)*
2. \*What is your current class year? *(Response options: 1st year, 2nd year, 3rd year, 4th year or more)*
3. \*What is your major? *(Drop down response relevant to each program)*
4. \*Is there any aspect of your identity that is important to you as a STEM student? *(free response)*