RISC post-course survey, annotated

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Like most surveys, the introductory text of this survey was an attempt to explain the survey and reassure the student respondent of their right to withdraw. We presume a new user will modify the text to fit their needs. Notice that any review by an Institutional Review Board is the responsibility of the faculty/staff user.

As the student begins, we ask for information that situates who they are and where they work. A name or identifier aids in matching Pre-course information to the post-course information. Notice that our questions allowed us to sort students into institutions and programs. If you are working with one program only you may not need all of these questions.

Many research programs, including those funded by grants, make statements about inclusion of all genders and ethnicities. Sometimes it is necessary to tally genders and ethnicities in the service of documenting inclusion. We conformed to the usually binary taxonomy of gender and to the NSF recommendations for ethnic categories. We also found it useful to ask students their educational level ("current status"). Change or keep as you see fit.

Please type your name, email, institution, and course information. This information will be used confidentially to match pre-course data to post-course data.

Name _____

Email address _____

Institution _____

Course department and number _____

Instructor's last name _____

Gender:

- ❍ Male
- ❍ Female
- ❍ Prefer not to answer

Ethnicity:

- ❍ Alaskan Native
- ❍ American Indian
- ❍ Asian American
- ❍ Black or African American
- ❍ Filipino
- ❍ Foreign National
- ❍ Hawaiian

- ❍ Hispanic/Latino
- ❍ Pacific Islander
- ❍ White
- ❍ Two or more races
- ❍ Other
- ❍ Prefer not to answer

What is your current status?

- ❍ I am a high school student.
- ❍ I am a first-year college undergraduate.
- ❍ I am a second-year college undergraduate.
- ❍ I am a third-year college undergraduate.
- ❍ I am a fourth-year college undergraduate.
- ❍ I am a graduate or medical student.
- ❍ Other
- ❍ Not applicable / Prefer not to answer

Did you declare a major or concentration yet?

- ❍ Yes
- ❍ No

What major or concentration have you declared? Please write it here (include double majors, concentrations, etc.)

_____

_____

If you have not yet declared a major or concentration, please indicate if you considering a major/concentration in the sciences.

- ❍ Definitely yes
- ❍ It is likely
- ❍ I'm not sure
- ❍ It is unlikely
- ❍ Definitely no
- ❍ Prefer not to answer

This question is about your goals beyond your undergraduate degree. It is difficult to list all the goals people may have. The purpose of this question is to learn how many students plan to go on in science, medicine, or other fields, as well as to learn how many students do not plan to go to post-graduate education in their near future. Please choose one:

- ❍ My goal is to go to graduate school for an advanced degree in a science-related field (including biology, chemistry, physics, mathematics, computer science, and psychology).

- ❍ My goal is to go to graduate school for an advanced degree in a social science (including sociology, anthropology, economics, and political science).
- ❍ My goal is to go to graduate school for an advanced degree in humanities or fine arts.
- ❍ My goal is earn a certification or degree that will qualify me for teaching.
- ❍ My goal is to go to school for a medical degree (M.D.).
- ❍ My goal is to go to a type of graduate education not mentioned above, such as law school.
- ❍ My goal does not include graduate education for at least the near future.
- ❍ Not applicable/Prefer not to answer.

The next question is about how the experience of this course influenced your plans about post-graduate education.

After taking this course,

- ❍ I have not considered any post-graduate education.
- ❍ I now plan not to pursue post-graduate education.
- ❍ I now plan to pursue a Master's degree in a science-related field.
- ❍ I now plan to pursue a Doctoral degree in a science-related field.
- ❍ I now plan to pursue a Master's degree in a field other than science.
- ❍ I now plan to pursue a Doctoral degree in a field other than science.
- ❍ I now plan to pursue a medical degree.
- ❍ I now plan to pursue a law, architectural, or other degree.
- ❍ Not applicable / Prefer not to answer.

The "course elements" section below is quite long, as it was intended to capture a wide range of experiences and to be repeated in both the faculty form and the student post-course survey. Many of the items also appear on the CURE survey, while additional items were inspired by the literature on interdisciplinary teaching and learning. Edit as you see fit.

Course Elements

Please rate how much learning you gained from each element you experienced in this course. The scale measuring your gain is from (no or very small gain) to (very large gain). Some elements may not have happened at all. If the item is not relevant or you prefer not to answer, please choose the "not applicable" option.

Level of gained experience

	None or very small gain	Small gain	Moderate gain	Large gain	Very large gain	N/A or Prefer not to answer
Working on a scripted lab or problem in which the students know the expected outcome.	❍	❍	❍	❍	❍	❍
Working on a lab or problem in which only the instructor knows the outcome.	❍	❍	❍	❍	❍	❍
Working on problems that have no clear solution.	❍	❍	❍	❍	❍	❍

	None or very small gain	Small gain	Moderate gain	Large gain	Very large gain	N/A or Prefer not to answer
Working on at least one problem that is assigned and structured by the instructor.	❍	❍	❍	❍	❍	❍
Working on a problem in which the students have some input into the research process and/or what is being studied.	❍	❍	❍	❍	❍	❍
Working on a project or problem entirely of student's own design.	❍	❍	❍	❍	❍	❍
Working individually.	❍	❍	❍	❍	❍	❍
Connecting your personal experience to the course problem or problems.	❍	❍	❍	❍	❍	❍
Working in small groups or teams.	❍	❍	❍	❍	❍	❍
Learning that the use of disciplinary knowledge needs to be accurate and fair.	❍	❍	❍	❍	❍	❍
Reading primary scientific literature within one field or discipline.	❍	❍	❍	❍	❍	❍
Receiving assigned coursework from more than one discipline or area of study.	❍	❍	❍	❍	❍	❍
Collecting data.	❍	❍	❍	❍	❍	❍
Analyzing data.	❍	❍	❍	❍	❍	❍
Learning that disciplines may approach problems in different and sometimes conflicting ways.	❍	❍	❍	❍	❍	❍
Presenting intellectual work in written papers or reports.	❍	❍	❍	❍	❍	❍
Presenting intellectual work in posters.	❍	❍	❍	❍	❍	❍
Using instruments or materials borrowed from another discipline or field of study.	❍	❍	❍	❍	❍	❍
Critiquing the work of other students.	❍	❍	❍	❍	❍	❍
Listening to lectures.	❍	❍	❍	❍	❍	❍
Working with students who major (or probably intend to major) in other disciplines or fields of study.	❍	❍	❍	❍	❍	❍
Learning to find similarities and differences between disciplines or fields of study.	❍	❍	❍	❍	❍	❍
Working on problem sets.	❍	❍	❍	❍	❍	❍

	None or very small gain	Small gain	Moderate gain	Large gain	Very large gain	N/A or Prefer not to answer
Taking tests in class.	❍	❍	❍	❍	❍	❍
Working on defining a problem and refining the definition while solving the problem.	❍	❍	❍	❍	❍	❍
Engaging in class discussion.	❍	❍	❍	❍	❍	❍
Maintaining lab notebooks.	❍	❍	❍	❍	❍	❍
Working on a problem that requires integrating ideas from two or more sciences.	❍	❍	❍	❍	❍	❍
Studying an interdisciplinary problem.	❍	❍	❍	❍	❍	❍
Spending the entire course on one or a few problems.	❍	❍	❍	❍	❍	❍
Reading a textbook.	❍	❍	❍	❍	❍	❍
Working on a problem that requires integrating ideas from both science and non-science disciplines.	❍	❍	❍	❍	❍	❍
Attempting a complete understanding of a complex problem.	❍	❍	❍	❍	❍	❍
Learning to ask "big questions" that implicate more than one discipline in a solution.	❍	❍	❍	❍	❍	❍
Talking with faculty members from other disciplines or fields of study.	❍	❍	❍	❍	❍	❍
Reading primary literature from multiple disciplines or fields of study.	❍	❍	❍	❍	❍	❍
Presenting intellectual work orally.	❍	❍	❍	❍	❍	❍
Becoming responsible for a part of a project.	❍	❍	❍	❍	❍	❍
Learning to translate the specialized language of a discipline into the language of other disciplines.	❍	❍	❍	❍	❍	❍
Writing a research proposal.	❍	❍	❍	❍	❍	❍
Learning about two (or more) disciplines so that new insights emerge from considering them together.	❍	❍	❍	❍	❍	❍
Working together with other students as a whole class.	❍	❍	❍	❍	❍	❍
Judging the relative contribution of disciplines to the solution of a problem.	❍	❍	❍	❍	❍	❍
Creating new metaphors, analogies, or models to understand problems.	❍	❍	❍	❍	❍	❍

	None or very small gain	Small gain	Moderate gain	Large gain	Very large gain	N/A or Prefer not to answer
Learning computer modeling of complex systems.	❍	❍	❍	❍	❍	❍
Studying problems with multiple causes that operate simultaneously and interactively.	❍	❍	❍	❍	❍	❍
Engaging in experiential learning in the course.	❍	❍	❍	❍	❍	❍
Calling upon your personal values to motivate the study of the problem or problems.	❍	❍	❍	❍	❍	❍

Benefits

This section is identical to the post-experience surveys SURE and CURE. It permits comparisons across survey data.

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 / Prefer not to answer" option.

	No gain or very small gain	Small gain	Moderate gain	Large gain	Very large gain	N/A or Prefer not to answer
Clarification of a career path	❍	❍	❍	❍	❍	❍
Skill in the interpretation of results	❍	❍	❍	❍	❍	❍
Tolerance for obstacles faced in the research process	❍	❍	❍	❍	❍	❍
Readiness for more demanding research	❍	❍	❍	❍	❍	❍
Understanding how knowledge is constructed	❍	❍	❍	❍	❍	❍
Understanding of the research process in your field	❍	❍	❍	❍	❍	❍
Ability to integrate theory and practice	❍	❍	❍	❍	❍	❍
Understanding of how scientists work on real problems	❍	❍	❍	❍	❍	❍
Understanding that scientific assertions require supporting evidence	❍	❍	❍	❍	❍	❍
Ability to analyze data and other information	❍	❍	❍	❍	❍	❍

	No gain or very small gain	Small gain	Moderate gain	Large gain	Very large gain	N/A or Prefer not to answer
Understanding science	❍	❍	❍	❍	❍	❍
Learning ethical conduct in your field	❍	❍	❍	❍	❍	❍
Learning laboratory techniques	❍	❍	❍	❍	❍	❍
Ability to read and understand primary literature	❍	❍	❍	❍	❍	❍
Skill in how to give an effective oral presentation	❍	❍	❍	❍	❍	❍
Skill in science writing	❍	❍	❍	❍	❍	❍
Self-confidence	❍	❍	❍	❍	❍	❍
Understanding of how scientists think	❍	❍	❍	❍	❍	❍
Learning to work independently	❍	❍	❍	❍	❍	❍
Becoming part of a learning community	❍	❍	❍	❍	❍	❍
Confidence in my potential to be a teacher of science	❍	❍	❍	❍	❍	❍

Overall evaluation

For each item below please rate your own agreement with the item.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Not applicable / Prefer not to answer
This course was a good way of learning about the subject matter.	❍	❍	❍	❍	❍	❍
This course was a good way of learning about the process of scientific research.	❍	❍	❍	❍	❍	❍
This course had a positive effect on my interest in science.	❍	❍	❍	❍	❍	❍
I was able to ask questions in this class and get helpful responses.	❍	❍	❍	❍	❍	❍

Some of the items in this section originated from a dissertation by Laura Wenk (2000)[1] subject to considerable discussion and revision by colleagues who helped develop the CURE survey. The section first appeared in the CURE. One in-depth analysis of the items is provided in Perera, et al. (2017)[2]. Using some same and similar items, Hoskins, et al. (2011) looked at epistemological changes following experience with the C.R.E.A.T.E. program[3]. You will note that I have highlighted some items in italics and some in bold. The 5 items in italics reliably factor together in a principal component factor analysis, or, if you prefer, show a high Cronbach's Alpha for inter-item consistency. I have found it useful to add these 5 scores to create a scale value that reflects a positive attitude toward science learning. The scores positively correlate with student reported learning gains. The 6 items underlined also emerge as related. I have summed them as a scale of negative perceptions of science learning, and find negative correlations with student reported learning gains. They are not published yet.

Your opinions about science

In the pretest you responded to questions about science. Below the questions are posed again. Your answers will help us decide between two hypotheses, that the opinions are reliable over time (test-retest reliability) or that the opinions change as a result of your experience.

For each item below please rate your agreement with the item.

	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**N/A**
Even if I forget the facts, I'll still be able to use the thinking skills I learn in science.	❍	❍	❍	❍	❍	❍
The process of writing in science is helpful for understanding scientific ideas.	❍	❍	❍	❍	❍	❍
I wish science instructors would just tell us what we need to know so we can learn it.	❍	❍	❍	❍	❍	❍
Creativity does not play a role in science.	❍	❍	❍	❍	❍	❍
Science is not connected to non-science fields such as history, literature, economics, or art.	❍	❍	❍	❍	❍	❍
I get personal satisfaction when I solve a scientific problem by figuring it out myself.	❍	❍	❍	❍	❍	❍
Science is essentially an accumulation of facts, rules, and formulas.	❍	❍	❍	❍	❍	❍
I can do well in science courses.	❍	❍	❍	❍	❍	❍
There is too much emphasis in science classes on figuring things out for yourself.	❍	❍	❍	❍	❍	❍

[1] Wenk, L. (2000). Improving Science Learning: Inquiry-based and traditional first-year college science college science curricula. Doctoral Disseration.
[2] Perera, V., et al. (2017). CBE-LSE, Winter, 16:ar60.
[3] Hoskins, S. G., et al. (2011). CBE-LSE, Winter, 10, 368-378.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	N/A
Explaining science ideas to others has helped me understand the ideas better.	❍	❍	❍	❍	❍	❍
If an experiment shows that something doesn't work, the experiment was a failure.	❍	❍	❍	❍	❍	❍