CURE 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 address, 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

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 intended to capture a wide range of experiences and to be repeated in both the faculty form and the student post-course survey. In the post-survey, students are reporting learning gains. It is useful to contextualize these gains be having the same elements in the pre-course survey. 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.

If students were expected to do the following course elements…

Level of gained experience

	None	Little	Some	Much	Extensive	N.A./Prefer not to answer
a scripted lab or project in which the students know the expected outcome.	❍	❍	❍	❍	❍	❍
a lab or project in which only the instructor knows the outcome.	❍	❍	❍	❍	❍	❍
a lab or project where no one knows the outcome.	❍	❍	❍	❍	❍	❍
at least one project that is assigned and structured by the instructor.	❍	❍	❍	❍	❍	❍
a project in which students have some input into the research process and/or what is being studied.	❍	❍	❍	❍	❍	❍
a project entirely of student design.	❍	❍	❍	❍	❍	❍
work individually.	❍	❍	❍	❍	❍	❍
work as a whole class.	❍	❍	❍	❍	❍	❍
work in small groups.	❍	❍	❍	❍	❍	❍
become responsible for a part of the project.	❍	❍	❍	❍	❍	❍
read primary scientific literature.	❍	❍	❍	❍	❍	❍
write a research proposal.	❍	❍	❍	❍	❍	❍

	None	Little	Some	Much	Extensive	N.A./Prefer not to answer
collect data.	❍	❍	❍	❍	❍	❍
analyze data.	❍	❍	❍	❍	❍	❍
present results orally.	❍	❍	❍	❍	❍	❍
present results in written papers or reports.	❍	❍	❍	❍	❍	❍
present posters.	❍	❍	❍	❍	❍	❍
critique the work of other students.	❍	❍	❍	❍	❍	❍
listen to lectures.	❍	❍	❍	❍	❍	❍
read a textbook.	❍	❍	❍	❍	❍	❍
work on problem sets.	❍	❍	❍	❍	❍	❍
take tests in class.	❍	❍	❍	❍	❍	❍
discuss reading materials in class.	❍	❍	❍	❍	❍	❍
maintain lab notebook.	❍	❍	❍	❍	❍	❍
computer modeling.	❍	❍	❍	❍	❍	❍

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

Benefits

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./ 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	❍	❍	❍	❍	❍	❍

	No gain or very small gain	Small gain	Moderate gain	Large gain	Very large gain	N.A./ Prefer not to answer
Understanding that scientific assertions require supporting evidence	❍	❍	❍	❍	❍	❍
Ability to analyze data and other information	❍	❍	❍	❍	❍	❍
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	N.A./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 with italics and some with underlining. 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.

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./Prefer not to answer**
Even if I forget the facts, I'll still be able to use the thinking skills I learn in science.	❍	❍	❍	❍	❍	❍
You can rely on scientific results to be true and correct.	❍	❍	❍	❍	❍	❍
The process of writing in science is helpful for understanding scientific ideas.	❍	❍	❍	❍	❍	❍
When scientific results conflict with my personal experience, I follow my experience in making choices.	❍	❍	❍	❍	❍	❍
Students who do not major/concentrate in science should not have to take science courses.	❍	❍	❍	❍	❍	❍
I wish science instructors would just tell us what we need to know so we can learn it.	❍	❍	❍	❍	❍	❍

[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./Prefer not to answer**
Creativity does not play a role in science.	❍	❍	❍	❍	❍	❍
Science is not connected to non-science fields such as history, literature, economics, or art.	❍	❍	❍	❍	❍	❍
When experts disagree on a science question, it's because they don't know all the facts yet.	❍	❍	❍	❍	❍	❍
I get personal satisfaction when I solve a scientific problem by figuring it out myself.	❍	❍	❍	❍	❍	❍
Since nothing in science is known for certain, all theories are equally valid.	❍	❍	❍	❍	❍	❍
Science is essentially an accumulation of facts, rules, and formulas.	❍	❍	❍	❍	❍	❍
I can do well in science courses.	❍	❍	❍	❍	❍	❍
Real scientists don't follow the scientific method in a straight line.	❍	❍	❍	❍	❍	❍
There is too much emphasis in science classes on figuring things out for yourself.	❍	❍	❍	❍	❍	❍
Only scientific experts are qualified to make judgments on scientific issues.	❍	❍	❍	❍	❍	❍
Scientists know what the results of their experiments will be before they start.	❍	❍	❍	❍	❍	❍
Explaining science ideas to others has helped me understand the ideas better.	❍	❍	❍	❍	❍	❍
The main job of the instructor is to structure the work so that we can learn it ourselves.	❍	❍	❍	❍	❍	❍
Scientists play with statistics to support their own ideas.	❍	❍	❍	❍	❍	❍
Lab experiments are used to confirm information studied in science class.	❍	❍	❍	❍	❍	❍

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	N.A./Prefer not to answer
If an experiment shows that something doesn't work, the experiment was a failure.	❍	❍	❍	❍	❍	❍