

## The CURE pre-course survey, annotated

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The Classroom Undergraduate Research Experience (CURE) survey grew out of a creative collaboration of faculty from Grinnell College, Hope College, Harvey Mudd College, and Wellesley College. The CURE may be used as a pretest-posttest or posttest-only survey to measure student experiences in "research-like" or other science courses. We recommend that you compose your own introductory text and that you consult your local Institutional Review Board for guidance on how to meet IRB standards.

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 usual 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.)

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**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 a Ph.D. degree in a biology-related field.
- My goal is to go to graduate school for a Ph.D. degree in the physical sciences (including engineering, math, and computer science).
- My goal is to go to graduate school for a Masters Degree in the life sciences.
- My goal is to go to graduate school for a Masters Degree in the physical sciences (including engineering, math, and computer science).
- My goal is to go to graduate school for a Masters or a Ph.D. degree in a social science (including psychology, sociology, anthropology, economics, and political science).
- My goal is to go to graduate school for a Masters or a Ph.D. in humanities or fine arts.
- My goal is to 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 school for an M.D./Ph.D.
- My goal is to go to school for other health professions.
- 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.

**Here is a list of common reasons for taking a course. Please read each one and indicate if the reason was important to your decision to take this course.**

	<b>Not important</b>	<b>Moderately Important</b>	<b>Very Important</b>	<b>Not applicable</b>
To fill a distribution requirement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To fill a requirement for my major	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I need it for graduate or professional school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I need it for my desired employment after college.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interest in the subject matter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To learn lab techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To learn about science and the research process	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To get hands-on research experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It fit in my schedule.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The course and/or the instructor has a good reputation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>





Some of the items in this section originated from a dissertation by Laura Wenk (2000)<sup>1</sup> 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)<sup>2</sup>. 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<sup>3</sup>. You will note that I have highlighted some items in italics and some in 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 yourself and about science

It has become common to say that no student is an empty bucket, waiting for a teacher to pour in knowledge. Research on learning acknowledges that students approach a course with well-formed opinions of themselves and of the subject matter. In this section we present questions about science and questions about you. These will help us put learning in context.

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

	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly agree</b>	<b>N/A</b>
<i>Even if I forget the facts, I'll still be able to use the thinking skills I learn in science.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You can rely on scientific results to be true and correct.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>The process of writing in science is helpful for understanding scientific ideas.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When scientific results conflict with my personal experience, I follow my experience in making choices.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Students who do not major/concentrate in science should not have to take science courses.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>I wish science instructors would just tell us what we need to know so we can learn it.</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<sup>1</sup> Wenk, L. (2000). Improving Science Learning: Inquiry-based and traditional first-year college science college science curricula. Doctoral Dissertation.

<sup>2</sup> Perera, V., et al. (2017). CBE-LSE, Winter, 16:ar60.

<sup>3</sup> Hoskins, S. G., et al. (2011). CBE-LSE, Winter, 10, 368-378.



Interest in “learning styles” may have declined in recent years. When the earlier versions of our surveys were constructed we were struck by the article by Romero, et al. (1992)<sup>4</sup>, in which learning styles (concrete vs abstract; reflective vs active) were predictive of college major. The items below are optional. Students sometimes have difficulty with them because they are bi-directional, with students moving their score to the left or the right depending on how they describe themselves. How you can score the results is described below the items.

## Paired Statements

Below are ten pairs of statements. The number scale between them is used to indicate how well a statement or a pair of statements describes you. For example, on the first pair, a "6" would indicate you are very action oriented, while a "4" would indicate you were more action-oriented than reflective, but somewhat reflective. **For each pair of statements, choose a number that indicates how well the statement describes you.** Do not worry that some pairs are not opposite.

### Responses

	1	2	3	4	5	6	NA	
I would describe myself as reflective.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I would describe myself as action oriented.
I prefer subjects with precise answers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I prefer subjects with multiple interpretations.
I value patience.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I value getting things done.
I like things to be varied and colorful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I like to be exact and precise.
I would describe myself as a doer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I would describe myself as an observer.
I take a creative and imaginative approach to solving problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I take a precise and calculated approach to solving problems.
I would describe myself as evaluative and logical.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I would describe myself as receptive and accepting.
I like to watch what is going on.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I like to see the results of my actions.
I strive for versatility.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I strive for accuracy.
I am reserved.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I am prepared.

<sup>4</sup> Romero, J.E., Tepper, B.J., Tetrault, L.A. (1992). Development and validation of new scales to measure Kolb’s (1985) learning style dimensions. *Educational and Psychological Measurement*, 52, 171-179.



Five items (1, 3, 5, 8, and 10) measure reflective observation versus active experimentation. Five items (2, 4, 6, 7, and 9) measure concrete experience versus abstract conceptualization. Some items (2,5, and 7) are reversed for scoring purposes. After several items are reflected (reverse scored) the relevant items are summed to create two scores for each individual. The range of scores is 5 to 30. On the reflective/active dimension a low score corresponds to a reflective learning style. On the concrete/abstract dimension a low score corresponds to a concrete learning style. In theory, the two dimensions are orthogonal. In real data sets, I have found the two dimensions to correlate slightly ( $r = .10$  to  $.20$ ). Following Romero, et al., each dimension is split at the median. Then the two scores are conjoined to classify each student respondent into one of four “quadrants” of learning style. In our reports, the results are displayed as coordinates on a graph. Here are the two dimensions of learning style, with typical majors as suggested by Romero, et al. The sciences typically are located in the “Assimilator” or “Converger” quadrants.

