

RISC pre-course survey, annotated

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RISC stands for Research on the Integrated Science Curriculum, and originated from discussions with colleagues on the need for a survey that captured student reports of learning in integrated or interdisciplinary science courses. Because definitions of “interdisciplinary” vary, the approach of the survey is inductive, i.e., to capture as many goals, behaviors, and outcomes that reflect what the instructor intends (as measured by the RISC instructor form). Here is our introductory text, which you should adapt and implement for your situation.

Welcome to the RISC pre-course survey site. This project is a collaborative effort involving faculty and students from many colleges and universities. Together we are learning more about the success of our science courses in empowering student learning. To accomplish this task we have developed a pre-course post-course research design to measure the learning gains and other outcomes of the course.

If you are beginning a course and the instructor has asked you to participate in this research, please fill out the pre-course survey questions. Because of the complexity of tracking the data from many courses in many institutions, we ask you to identify yourself, your college, and your course. The reason for this identification is that we will match your pre-course information with a post-course evaluation that we will ask you to complete later. This alignment of your pre-course responses with your post-course responses permits a sensitive measure of change. Your individual data will not be revealed to your course instructor. Your data will not be used by instructors to determine your grade in the course.

As with any research, you are not compelled to participate. You may elect to not answer individual questions. A "not applicable" or "N.A." option is available for the questions as an alternative if the question is irrelevant or you choose not to answer. If you change your mind about completing the survey, just leave the site. It is assumed that the submission of a completed survey is your consent for participation

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.

Some general information about you and your situation

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 “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 look over this inventory of elements that might be included in a course. For each element, give an estimate of your current level of ability before the course begins.

[illegible]

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. program³. You will note that I have highlighted some items in green and some in red. 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 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.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	N.A.
<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"/>
<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"/>
<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"/>
<u>Creativity does not play a role in science.</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Science is not connected to non-science fields such as history, literature, economics, or art.</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>I get personal satisfaction when I solve a scientific problem by figuring it out myself.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Science is essentially an accumulation of facts, rules, and formulas.</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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

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

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

[illegible]

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)⁴, 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.

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.

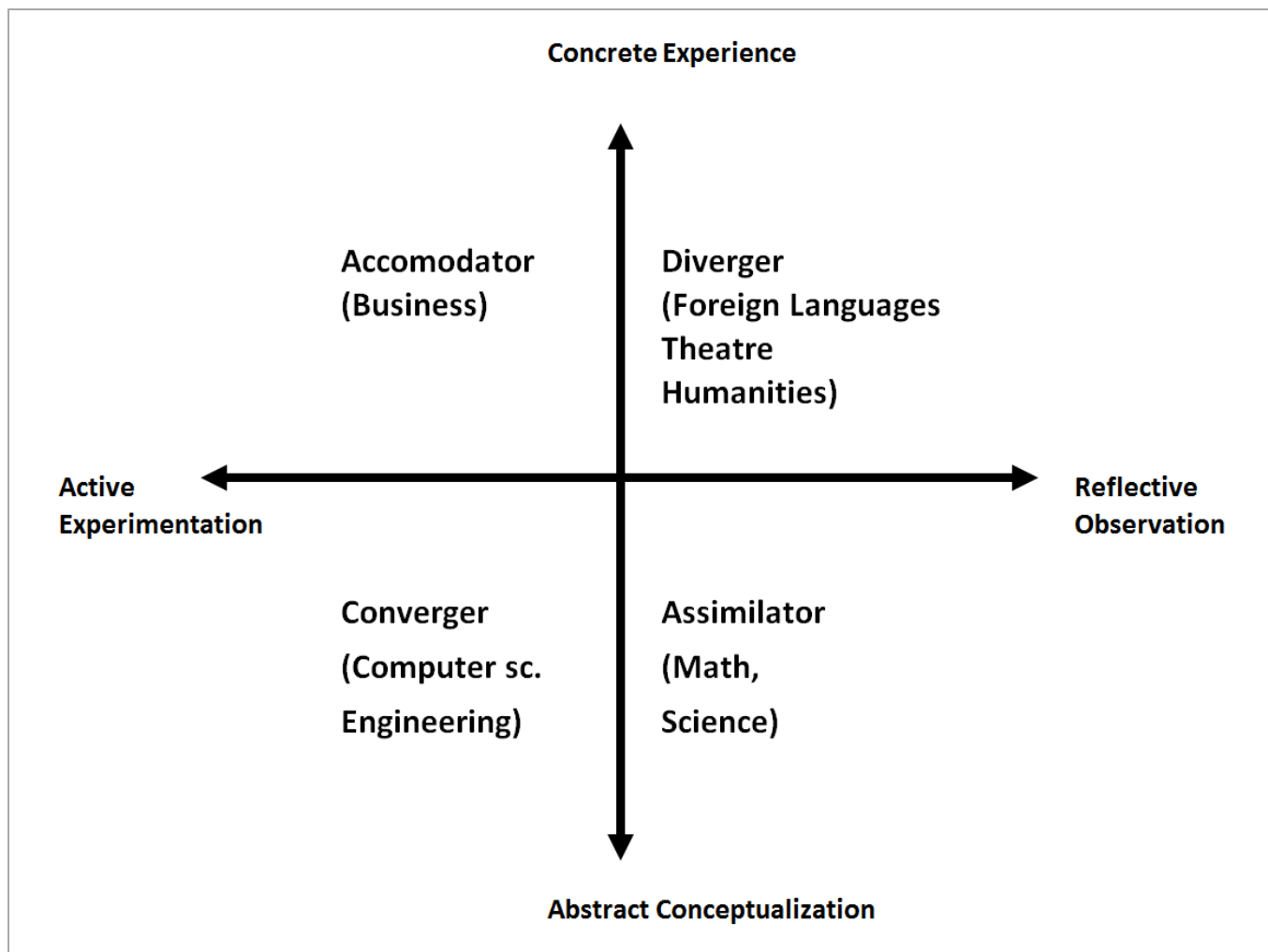
Responses

	Scale							
	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.

⁴ 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.



This section below was derived from other well-known surveys such as the CIRP (Cooperative Institutional Research Program) freshman survey. The student reflects on their relative level of skill on various topics. I have not published any data on this section. The scale is not equally segmented.

Finally, please think of how you place yourself relative to your fellow students at your institution. Use this scale to indicate your skills relative to your peers:

	Level of skill					
	I am in the lowest 10%	Not the lowest but below average	Average	Not the highest but above average	I am in the highest 10%	N.A. / Prefer not to answer
Creativity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leadership	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participation in class discussions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Skill in setting realistic yet challenging goals for myself	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Writing skill	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Skill in accurately estimating the time it takes to complete assignments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Working with a student group or team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mathematical skill	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>