

# Supplemental Material

*CBE—Life Sciences Education*

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## **SELF-EFFICACY FOR LEARNING AND DOING SCIENCE**

The Self-Efficacy for Learning and Doing Science questionnaire (see page 2) measures one's confidence in learning science topics, engaging in scientific activities, and more generally in being a scientist. Self-efficacy for science is associated with persistence in the pursuit of science-oriented activities. This questionnaire was developed and tested in the context of informal science learning environments (primarily with participants of Citizen Science projects).

### **Cleaning your data**

Some project participants will not respond as carefully as you might hope. It is important to clean your data to account for this. Once you have entered the data into a spreadsheet such as Microsoft Excel, keep the original as a master, and make a copy from which to work. Do the following simple checks:

- 1.) Go down each row (observer) and look across the set of responses for that observer – if two or more responses are missing, exclude that row from your analysis.
- 2.) Once again, go down each row (observer) and look across the set of responses for that observer. Then scroll through the rows looking for sets where all of the responses are the same.

In general, seeing the same response across all of the items is an indication that the respondent was not reading the items carefully. In particular, items 3 and 7 are “reverse coded,” which means they are worded in such a way that they should receive opposite answers from other questions if respondents are answering all questions in a consistent manner. We recommend excluding sets where all answers are the same from your analysis *unless* the answers are all 3s, as many respondents do legitimately use midpoint responses to all questions.

### **Scoring instructions**

Once you have implemented the Self-Efficacy for Learning and Doing Science questionnaire and have cleaned your data, calculate the self-efficacy score as follows:

- 1.) Reverse the responses to questions 3 and 7 such that 1s become 5s, 2s become 4s, 3s stay 3s, 4s become 2s, and 5s become 1s.
- 2.) Average together the scores for all of the items for each participant.
- 3.) You can also average together the overall scores from all of your participants for an overall group score.
- 4.) Scores below 3 indicate low levels of confidence in learning project-related information and/or participating in project activities. Given that the questionnaire includes separate sets of items for learning (items 1-4) and doing (items 5-8), you might want to average those sets of responses (either for individual or group) separately to investigate whether participants are more or less confident with one or the other concept.

Note that if you are administering the questionnaire before and after program participation and comparing the two sets of scores as part of a pre-post evaluation, you might want to consider first grouping your participants into those who started out relatively low in self-efficacy and those who started out relatively high in self-efficacy. While it is reasonable to expect an increase among participants who started out relatively low in self-efficacy, you should not expect to see much, if any, increase in those who started out already quite confident in their abilities. You should consider merely maintaining that high level as a positive outcome.

**SELF-EFFICACY FOR LEARNING AND DOING SCIENCE (REMOVE TITLE BEFORE ADMINISTERING)**

Please indicate how much you **DISAGREE** or **AGREE** with each of the following statements about science by placing an **X** in the appropriate column. Please respond as you really feel, rather than how you think “most people” feel.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<b>These statements are about how you feel about <u>learning and understanding science topics</u>.</b>					
1. I think I'm pretty good at understanding science topics.	1	2	3	4	5
2. Compared to other people my age, I think I can quickly understand new science topics.	1	2	3	4	5
3. It takes me a long time to understand new science topics.	1	2	3	4	5
4. I feel confident in my ability to explain science topics to others.	1	2	3	4	5
<b>These statements are about how you feel about <u>doing scientific activities</u>.</b>					
5. I think I'm pretty good at following instructions for scientific activities.	1	2	3	4	5
6. Compared to other people my age, I think I can do scientific activities pretty well.	1	2	3	4	5
7. It takes me a long time to understand how to do scientific activities.	1	2	3	4	5
8. I feel confident about my ability to explain how to do scientific activities to others.	1	2	3	4	5

\* This scale is still in development and subject to possible changes as testing continues