

# Supplemental Material

*CBE—Life Sciences Education*

Gregg-Jolly *et al.*

## Second year Science Survey

Question #	Question
<b>Attitude</b>	(Renninger & Schofield, 2014)
1	How much fun is math or science for you?
2	How likely are you to do math or science problems that are not assigned?
3	How likely are you to read about math or science in your spare time?
4	How likely are you to talk about math or science outside of work you need to do for class?
5	How easy is it for you to get absorbed in solving math or science problems?
6	How much do you enjoy solving problems using mathematics?
7	How much do you like the hierarchical nature of math or science?
8	How confident are you in your ability to do math or science?
9	How curious are you about math or science problems?
10	To what extent do you consider yourself a mathematician or scientist?
11	How much math and science do you know?
<b>Community</b>	(Gross et al., 2015)
12	My level of knowledge about math and science is:
13	I know where to find research resources.
14	I feel comfortable in approaching faculty members when I need help.
15	I am interested in talking about math or science outside of the work I do for my courses.
16	I have confidence in my ability to get involved with student study groups.
17	I have a sense of belonging at Grinnell.
18	I have a sense of belonging in the Grinnell science and math departments.
19	I am interested in taking more classes in math or science.
20	I am interested in majoring in a math or science discipline. (n=102)
21	I am interested in a career in math or science.
22	I see the value of math and science in everyday life.
<b>Identity</b>	(Lopatto)
23	Even if I forget the facts; I'll still be able to use the thinking skills I learn in science and math.
24	The process of writing in math and science is helpful for understanding mathematical and scientific ideas.

25	I wish math and science instructors would just tell us what we need to know so we can learn it.
26	Creativity does not play a role in math or science.
27	Science and math are not connected to non-science fields such as history; literature; economics; or art.
28	I get personal satisfaction when I solve a scientific or mathematical problem by figuring it out myself.
29	Science and math are essentially an accumulation of facts; rules; and formulas.
30	I can do well in math or science courses.
31	There is too much emphasis in math and science classes on figuring things out for yourself.
32	Explaining science ideas or math ideas to others has helped me understand the ideas better.
33	If an experiment shows that something doesn't work; the experiment was a failure.

Questions from:

Renninger, K. A. & Schofield, L. S. (2014, April). Assessing STEM Interest as a Developmental Motivational Variable. Poster presented as part of a structured poster session (K. A. Renninger & S. Hidi, Chairs), Current approaches to interest measurement. American Educational Research Association, Philadelphia, PA.

Gross, D., Iverson, E., Willett, G., Manduca, C., (2015) "Broadening Access to Science With Support for the Whole Student in a Residential Liberal Arts College Environment," Journal of College Science Teacher, 44, 99-107.

Lopatto D, <https://www.grinnell.edu/academics/areas/psychology/assessments/cure-survey>.

## Second Year Science Retreat Schedule

### Saturday

- 7:45 a.m. Load and Depart
- 9:00-10:00 a.m. Welcome and Challenges and opportunities: The 2<sup>nd</sup> year experience (with student leaders)
- 10:00-10:30 a.m. Reflections with upper-class leaders in small group break-out sessions, including faculty and staff
- 10:30-10:45 a.m. Break
- 10:45-11:45 a.m. Alumni Panel: What mattered most in your education?
- 11:45-12:45 p.m. LUNCH (tables intermingled with faculty, staff, peer leaders, and alumni)
- 12:45-1:15 p.m. Group work problems (skits and resolutions, including small break-out sessions with student leaders, faculty and staff)
- 1:15-3:15 p.m. Breakout Sessions or Challenge Activities (see below)
- 3:15-3:30 p.m. BREAK
- 3:30-5:30 p.m. Breakout Sessions or Challenge Activities (see below)
- 5:30-5:45 p.m. Closing and dinner distribution

### Breakout sessions:

- Off-campus study
- MAPs/REUs/Internships
- Choosing your major: how (un)important is it?
- Making the most of your advisor relationship
- Taking charge of the second-year experience
- Stress: how to tame it AND Healthy eating/sleeping/study habits
- Careers, Life, and Service

### Challenge activities:

- Rotation through three different outdoor physical and social activities designed to build community and group work skills

Table S1. ANOVA summary for analysis of success rates among 4 student groups (SOC/FG, Other/FG, SOC/not FG, Other/not FG). The data are drawn from all 200-level courses in the sciences.

Source	Sum of Squares	df	Mean Square	F
Student groups	7.457	3	2.486	19.412**
Error	659.3	5149	.128	
Total	666.80	5152		

\*\*p < .01

Table S2. ANOVA summary for analysis of success rates among 4 student groups (SOC/FG, Other/FG, SOC/not FG, Other/not FG). The data are drawn from two courses, Biology 251 (Molecules, Cells, and Organisms) and Chemistry 221 (Organic Chemistry).

Source	Sum of Squares	df	Mean Square	F
Student groups	1.121	3	0.374	2.997*
Error	165.3	1325	0.125	
Total	166.4	1328		

\*p < .05

Table S3. Tamhane Comparisons for success rates in all 200-level courses and for two gateway courses before and after the programmed intervention.

Comparison	Pre-Intervention		Post-Intervention		95% CI			
	Mean	SD	Mean	SD	Mean Difference	SE	Lower bound	Upper bound
All other 200-level courses	79%	.41	79%	.41	-.06%	.02	-5.8%	5.6%
Gateway courses	73.5%	.44	88%	.33	14.5%*	.06	-0.5%	29.0%

\*p < .05 for a directional hypothesis, post > pre.

Table S4. An independent samples t-test comparing pre- and post-intervention success rates. For this analysis the SOC and FG group were collapsed into one group. The group “Other” was not included in this analysis. Pre- to post-intervention success rates for the Other group were not significantly different.

	Mean	SD	N	t
Gateway courses pre-intervention	73%	.44	83	2.54*
Gateway courses post-intervention	88%	.33	134	

\*p < .05

Table S5. Response rates for the 2<sup>nd</sup> year survey.

Year	Number of Invitations	Number of Responses	Response Rate
2013	222	103	46%
2014	240	101	42%
2015	234	87	37%
Total	696	291	42%