

Appendix A
Questions Used in Survey

Question number	Question
Q1	What gender do you identify as? (Male, Female, Prefer not to say)
Q2	Is English your first language? (Yes, No)
Q3	When I read the primary scientific literature... (1. I only read specific parts, 2. I skim to collect the information I need, 3. I read all the way through but not in a thorough manner, 4. I read carefully and try to understand it as much as possible.)
Q4	How often do you read primary scientific literature? (1. More than 3 days a week, 2. 1-3 days a week, 3. 1-3 days a month, 4. Less than one day a month, 5. Almost never.)
	Likert questions: Strongly disagree, Disagree, Neutral, Agree, Strongly agree.
Q5	Reading primary scientific literature is an important part of studying science (van Lacum et al., 2012).
Q6	Reading primary scientific literature is time-consuming (Smith, 2001). NEG

Q7	Reading primary scientific literature is challenging (Hoskins, Lopatto, & Stevens, 2011). NEG
Q8	Reading primary scientific literature improves my critical thinking (Coil et al., 2010; Gottesman & Hoskins, 2013).
Q9	I read primary scientific literature because I think it is important for my study (van Lacum et al., 2012; Smith, 2001).
Q10	I only read primary scientific literature because the assignments ask me to do so (Brownell, Price, & Steinman, 2013). NEG
Q11	I only read primary scientific literature because my teachers require me to do so (Coil et al., 2010). NEG
Q12	Besides the recommended list for my studies I also read other primary scientific papers (Gottesman & Hoskins, 2013).
Q13	I can understand the scientific language in primary scientific literature (Hoskins et al., 2011; Willard & Brasier, 2014).
Q14	I can understand the method(s) used in primary scientific literature (Gottesman & Hoskins, 2013).
Q15	I can understand the controls of the experiments in primary scientific literature (Gottesman & Hoskins, 2013; Hoskins et al., 2011).
Q16	After I read primary scientific literature, I can accurately paraphrase those articles in my written tasks (Brownell et al., 2013).
Q17	I do not learn from reading primary scientific literature (Smith, 2001). NEG
Q18	I am now less intimidated by reading primary scientific literature than when I was in first year (Smith, 2001).

Q19	I am now more comfortable interpreting graphs, figures and tables than I was in first year (Smith, 2001).
Q20	The primary scientific literature helps me understand lecture material better (Smith, 2001).
Q21	I have difficulty understanding why a particular experiment was performed in a primary scientific paper (Brownell et al., 2013). NEG
Q22	I do not feel confident in my ability to understand the main findings/conclusions of a primary scientific paper (Brownell et al., 2013). NEG
Q23	Reading primary research papers is often a stressful experience for me (Round & Campbell, 2013). NEG
Q24	I tend to get frustrated when trying to understand primary research papers (Round & Campbell, 2013). NEG
Q25	I feel confident in my ability to communicate the results of the experiment after reading primary scientific literature (Brownell et al., 2013; Hoskins et al., 2011).
Q26	I feel confident in my ability to read and evaluate primary literature (Hoskins et al., 2011).

Note. NEG indicates negatively phrased questions.

Appendix B

Means and Standard Deviation of Student Answers According to Gender and English as a First Language (EFL) or Second Language (ENFL), With *T*-Test Results

Q	Male <i>n</i> = 37	Female <i>n</i> = 98	<i>p</i> , t-test <i>n</i> = 135	EFL <i>n</i> = 113	ENFL <i>n</i> = 24	<i>p</i> , t-test <i>n</i> = 137
5	4.16 ± 0.90	4.23 ± 0.78	0.67	4.19 ± 0.85	4.29 ± 0.75	0.54
6	4.32 ± 0.78	4.43 ± 0.80	0.5	4.47 ± 0.70	4.08 ± 1.10	0.11
7	3.92 ± 0.83	4.11 ± 0.77	0.22	4.03 ± 0.82	4.25 ± 0.61	0.13
8	4.08 ± 0.80	4.01 ± 0.86	0.65	4.02 ± 0.83	4.13 ± 0.85	0.58
9	3.65 ± 0.95	3.54 ± 1.11	0.58	3.51 ± 1.05	3.88 ± 1.08	0.14
10	3.84 ± 1.24	4.21 ± 0.98	0.1	4.09 ± 1.07	4.21 ± 1.02	0.61
11	3.38 ± 1.30	3.89 ± 1.08	0.04 *	3.74 ± 1.16	3.79 ± 1.14	0.85
12	3.14 ± 1.29	2.69 ± 1.34	0.08	2.73 ± 1.34	3.25 ± 1.26	0.08
13	3.86 ± 0.89	3.67 ± 0.91	0.27	3.70 ± 0.91	3.83 ± 0.87	0.5

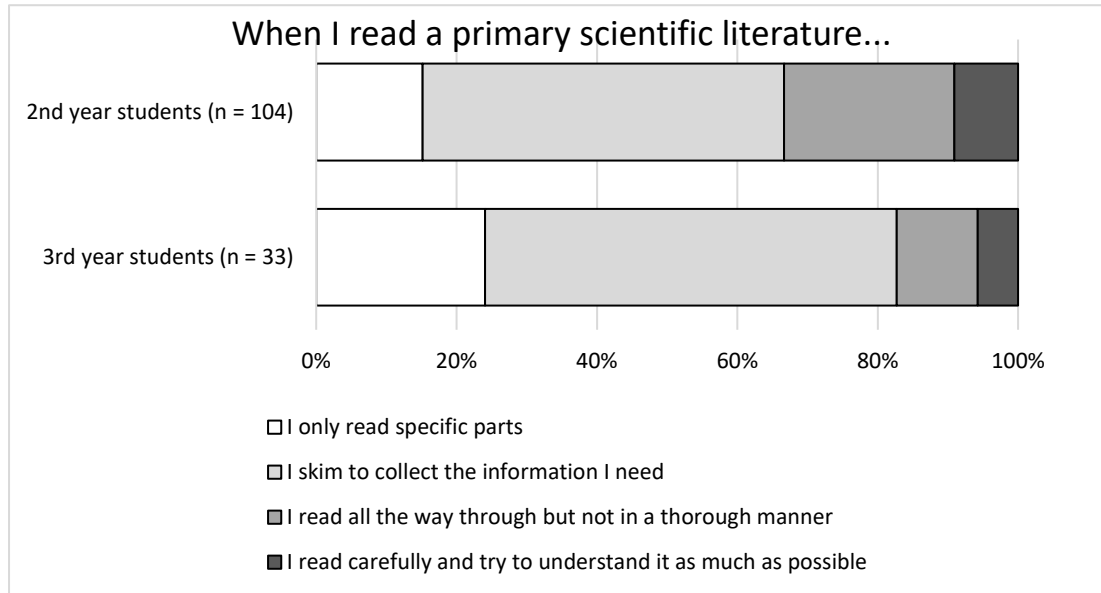
14	3.62 ± 0.72	3.56 ± 0.99	0.7	3.55 ± 0.95	3.67 ± 0.82	0.54
15	3.89 ± 0.70	3.95 ± 0.84	0.69	3.95 ± 0.80	3.88 ± 0.80	0.69
16	3.57 ± 0.84	3.60 ± 0.93	0.84	3.59 ± 0.90	3.58 ± 0.88	0.96
17	1.81 ± 0.78	2.20 ± 1.02	0.02 *	2.09 ± 0.98	2.17 ± 0.92	0.71
18	4.05 ± 1.05	3.91 ± 1.03	0.47	3.93 ± 1.05	4.08 ± 0.93	0.48
19	4.19 ± 0.74	3.80 ± 0.98	0.01 *	3.88 ± 0.93	4.00 ± 0.93	0.59
20	3.54 ± 1.07	3.53 ± 1.09	0.96	3.46 ± 1.12	3.92 ± 0.78	0.02 *
21	2.97 ± 0.87	2.89 ± 0.94	0.62	2.88 ± 0.94	2.96 ± 0.81	0.7
22	2.49 ± 0.93	2.83 ± 1.09	0.08	2.67 ± 1.06	2.96 ± 1.04	0.23
23	2.73 ± 1.10	3.43 ± 1.07	0.001 **	3.19 ± 1.11	3.38 ± 1.14	0.48
24	2.92 ± 1.09	3.51 ± 1.02	0.006 **	3.33 ± 1.10	3.46 ± 0.88	0.53
25	3.38 ± 0.92	3.34 ± 0.92	0.83	3.38 ± 0.91	3.21 ± 0.93	0.41

26	3.62 ± 0.95	3.56 ± 0.99	0.73	3.58 ± 1.00	3.54 ± 0.83	0.84
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Note. Means and standard deviation of student answers according to gender and according to English as a first language (EFL) or second language (ENFL), with *t*-test results.

Appendix C

Differences Between Cohorts of Students in Responses to Q3



Note. Q3: “When I read primary scientific literature...”; chi-square test ($d.f. = 3, n = 137, p = 0.229$).

Appendix D

Differences in Means of Answers by Student Years (Mean +/- Standard Deviation)

Q	Year 2	Year 3	<i>p</i> , t-test <i>n</i> = 137
5	4.07 ± 0.84	4.64 ± 0.65	<0.001 ***
6	4.38 ± 0.80	4.48 ± 0.76	0.48
7	4.08 ± 0.78	4.03 ± 0.81	0.77
8	3.90 ± 0.84	4.45 ± 0.67	<0.001 ***
9	3.43 ± 1.09	4.03 ± 0.81	0.001 **
10	4.24 ± 0.97	3.70 ± 1.2	0.02 *
11	3.87 ± 1.12	3.39 ± 1.20	0.05 *
12	2.65 ± 1.31	3.36 ± 1.32	0.01 *
13	3.66 ± 0.93	3.91 ± 0.77	0.13
14	3.60 ± 0.95	3.48 ± 0.83	0.52

15	3.94 ± 0.85	3.91 ± 0.63	0.81
16	3.52 ± 0.92	3.82 ± 0.77	0.07
17	2.27 ± 0.99	1.58 ± 0.66	<0.001 ***
18	3.74 ± 1.05	4.64 ± 0.78	<0.001 ***
19	3.71 ± 0.92	4.52 ± 0.67	<0.001 ***
20	3.40 ± 1.08	3.97 ± 0.98	0.01 *
21	2.83 ± 0.86	3.12 ± 1.05	0.15
22	2.85 ± 1.04	2.33 ± 1.02	0.02 *
23	3.33 ± 1.09	2.91 ± 1.13	0.07
24	3.43 ± 1.05	3.09 ± 1.07	0.12
25	3.30 ± 0.90	3.52 ± 0.97	0.27
26	3.48 ± 0.98	3.88 ± 0.89	0.03 *

Appendix E

Correlations Between Students' Answers to Each Question Using Spearman's Rank-Order Correlation Test

	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26
Q3	.177 * 0.03 8	.071 0.40 8	.001 0.98 8	.173 * 0.04 4	.152 0.07 7	-.11 9	-.09 7	.188 * 0.28 9	-.01 4	.136 0.11 4	.120 0.16 2	.222 ** 0.00 9	-.18 2* 0.03 3	.152 0.07 6	.049 0.56 9	.166 0.05 3	.017 0.84 5	-.10 9	-.04 9	-.07 1	.091 0.29 4	.138 0.11 0
Q4	-.46 0** <0.0 01	.060 0.48 9	.120 0.16 3	-.41 7** <0.0 01	-.49 9** <0.0 01	.397 ** <0.0 01	.454 ** <0.0 01	-.33 1** <0.0 01	-.20 1* 0.01 9	-.16 4	-.17 0* 0.05 5	-.23 9** 0.00 5	.476 ** <0.0 01	-.42 8** <0.0 01	-.33 0** <0.0 01	-.43 2** <0.0 01	.134 0.11 8	.296 ** <0.0 01	.292 ** 0.00 1	.188 * 0.02 8	-.15 2	-.30 1** <0.0 01
Q5		0.04 5 0.59 8	0.13 4 0.11 8	0.47 7 <0.0 01	0.43 1 <0.0 01	- 0.29 5 <0.0 01	- 0.25 0.00 3	0.36 8 <0.0 01	0.12 9	0.02 9	0.02 8	0.24 8	- 0.44 3 <0.0 01	.351 ** <0.0 01	.302 ** 0.00 1	.416 ** <0.0 01	-.03 2	-.25 6** 0.00 3	-.14 9	-.07 3	.072 0.40 7	.260 ** 0.002
Q6			0.3 85 <0. 00 1	-.0 91 0.2 91	-.1 17 0.1 75	.17 4* 0.0 42	.24 9** 0.0 03	-.1 03 0.2 30	-.2 50* * 0.0 03	-.1 82* 0.0 33	-.1 00 0.2 46	.02 9	.10 8	-.0 11	-.0 10	-.1 10	.06 6	.20 3* 0.0 17	.34 6** <0. 00 1	.37 7** <0. 00 1	-.1 67	-.1 24 0.1 50
Q7				-.0 05 0.9 50	-.1 04 0.2 25	.24 2** 0.0 04	.20 3* 0.0 17	-.1 12 0.1 93	-.3 30* * <0. 00 1	-.2 91* * 0.0 01	-.2 15* 0.0 12	-.1 13	.18 9* 0.0 27	-.1 25	-.2 00* 0.0 19	-.0 97	.12 7	.24 4** 0.0 04	.30 8** <0. 001	.46 2** <0. 00 1	-.2 49* * 0.0 03	-.2 31* * 0.0 07
Q8					.29 0** 0.0 01	-.2 74* * 0.0 01	-.2 05* 0.0 16	.29 5** <0. 00 1	.21 3* 0.0 12	.18 2* 0.0 34	.17 9* 0.0 36	.23 9** 0.0 05	-.4 66* * <0. 00 1	.49 5** <0. 00 1	.31 2** <0. 00 1	.45 6** <0. 00 1	.00 5	-.2 82* * 0.0 01	-.2 21* * 0.0 09	-.1 74* 0.0 43	.21 0* 0.0 14	.30 7** <0. 00 1

											0.0 05	<0. 00 1	0.0 31	0.0 44	0.0 15	0.0 35	<0. 00 1	0.3 72	0.0 02	0.0 06	0.0 47	
Q 1 6												-.31 9** <0.0 01	.335 ** <0.0 01	.275 ** 0.00 1	.189 * 0.02 7	-.03 3 0.70 0	-.31 5** <0.0 01	-.18 6* 0.03 0	-.21 9* 0.01 0	.381 ** <0.0 01	.374 ** <0.0 01	
Q 1 7													-.47 9** <0.0 01	-.47 5** <0.0 01	-.36 5** <0.0 01	.258 ** 0.00 2	.489 **<0 .001	.396 ** <0.0 01	.415 ** <0.0 01	-.27 7** <0.0 01	-.39 1** <0.0 01	
Q 1 8														.571 ** <0.0 01	.347 ** 0.00 1	-.07 4 0.38 9	-.37 7** <0.0 01	-.17 3* 0.04 3	-.26 0** 0.00 2	.214 * 0.01 2	.283 ** 0.00 1	
Q 1 9															.477 ** <0.0 01	-.13 50.1 15 01	-.40 3** <0.0 01	-.25 4** 0.00 3	-.41 5** <0.0 01	.265 ** 0.00 2	.204 * 0.01 7	
Q 2 0																-.08 6 0.31 8	-.26 3** 0.00 2	-.16 9* 0.04 8	-.23 7** 0.00 5	.265 ** 0.00 2	.289 ** 0.00 1	
Q 2 1																		.360 ** <0.0 01	.371 ** <0.0 01	.226 ** 0.00 8	-.02 2 0.79 6	-.02 0 0.81 8
Q 2 2																			.525 ** < 0.00 1	.463 **<0 .001	-.35 3** <0.0 01	-.37 1** <0.0 01
Q 2 3																				.598 ** <0.0 01	-.27 7** 0.00 1	-.28 6** 0.00 1

