

Supplemental Online Materials

for

Active learning *not* associated with student learning in a random sample of college biology courses

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Table S1. Comparisons between mean test scores and learning gains between courses using paper and online testing

	Means		Welch's <i>t</i> -statistic	<i>p</i> -value
	Paper	Online		
CINS-abbr pre	5.54	5.32	-0.91	0.37
CINS-abbr post	6.93	6.37	-1.70	0.10
Cheetah pre	2.77	2.99	0.80	0.43
Cheetah post	3.06	3.35	1.15	0.26
CINS-abbr effect size	0.57	0.46	-1.20	0.24
Cheetah effect size	0.12	0.16	0.58	0.57

Table S2. Comparisons between mean test scores and learning gains between courses offering course credit to log into the tests and courses not offering course credit

	Means		Welch's <i>t</i> -statistic	<i>p</i> -value
	Credit	No credit		
CINS-abbr pre	5.28	5.69	1.58	0.12
CINS-abbr post	6.31	7.11	2.33	0.03
Cheetah pre	2.94	3.12	0.52	0.61
Cheetah post	3.30	3.44	0.42	0.68
CINS-abbr effect size	0.44	0.61	1.62	0.12
Cheetah effect size	0.15	0.13	-0.39	0.70

Table S3. Pearson's correlation matrix for learning gains on the CINS-abbr

	Effect size	Average normalized gain	Percent change	Raw change	CINS- abbr pre-test	CINS- abbr post-test
Effect size	–					
Average normalized gain	0.95***	–				
Percent change	0.92***	0.82***	–			
Raw change	0.98***	0.95***	0.95***	–		
CINS-abbr pre- test	0.27	0.51*	-0.03	0.25	–	
CINS-abbr post- test	0.73***	0.88***	0.5*	0.73***	0.85***	–

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The Holm-Bonferonni method was used to calculate p -values.

Table S4. Pearson's correlation matrix for learning gains on the cheetah question

	Effect size	Average normalized gain	Percent change	Raw change	Cheetah pre-test	Cheetah post-test
Effect size	–					
Average normalized gain	0.99***	–				
Percent change	0.86***	0.79***	–			
Raw change	0.99***	0.99***	0.87***	–		
Cheetah pre-test	-0.24	-0.14	-0.62**	-0.27	–	
Cheetah post-test	0.27	0.37	-0.17	0.24	0.87***	–

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The Holm-Bonferonni method was used to calculate p -values.

Table S5. Comparisons between fully participating instructors and partially participating instructors, using Welch's *t*-tests for continuous data

	Means		Welch's <i>t</i> -statistic	<i>p</i> -value
	Fully	Partially		
Weekly frequency of specific active learning exercises	8.03	5.14	-1.64	0.11
Class size	233	208	-0.54	0.59
Years of teaching experience	14.56	13.59	-0.28	0.78
Hours of class time dedicated to teaching natural selection	4.77	5.97	0.82	0.42
Proportion of students regularly attending class	0.79	0.78	-0.32	0.76

Table S6. Comparisons between fully participating instructors and partially participating instructors, using Fisher's exact tests for count data

		Counts		<i>p</i> -value
		Fully	Partially	
Instructor position	Tenure track	15	16	0.06
	Non-tenure track	18	8	
Institution type	Private	2	5	0.10
	Public	31	17	
Sampling list	Top 50	10	5	0.76
	Large state institution	23	17	
General active learning use	Never (or almost never)	4	6	0.14
	Once per week	9	9	
	Once per class	8	3	
	More than once per class	12	3	

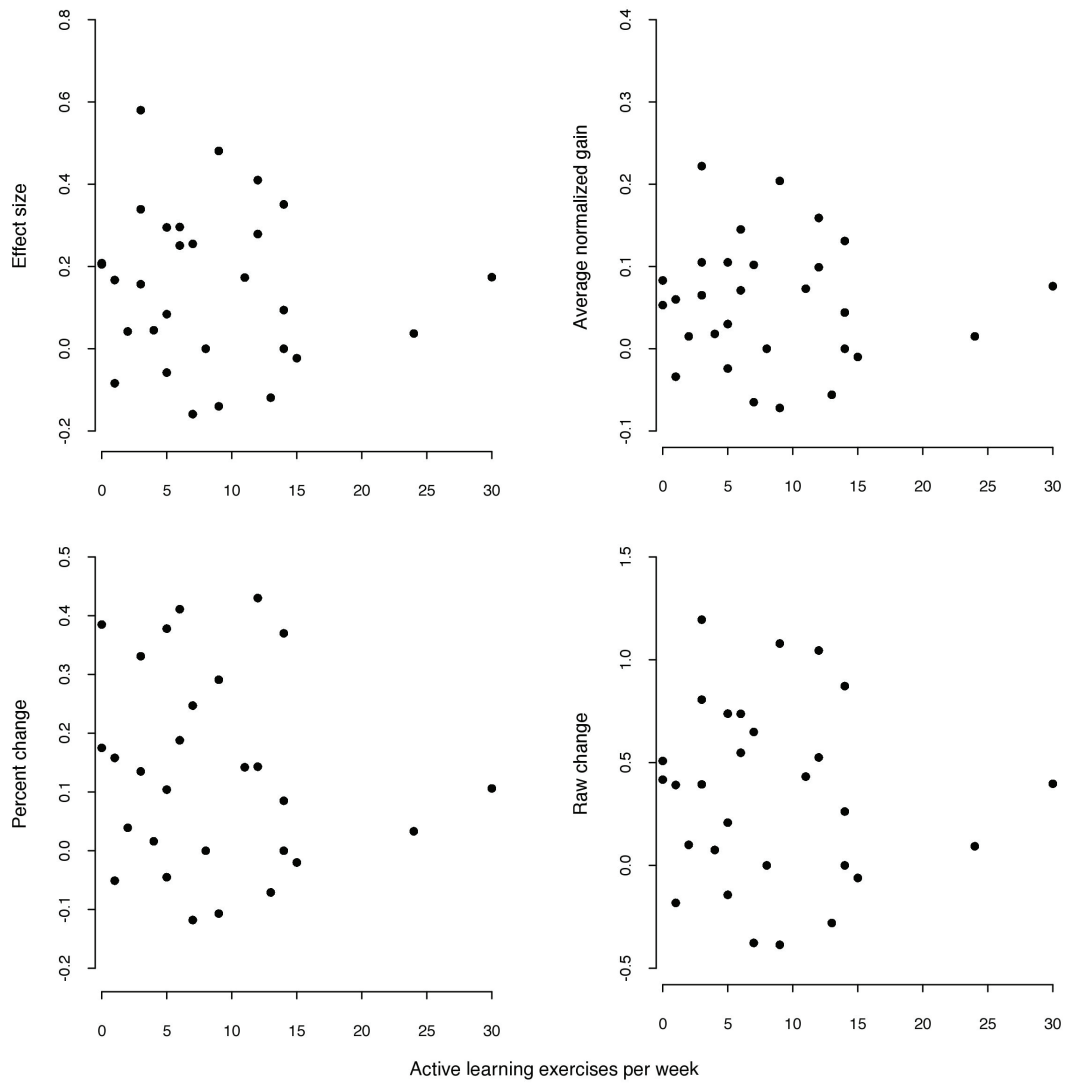


Figure S1. Scatterplots of four calculations of learning gains on the cheetah question and active learning exercises per week.

Relationship between instructor's use of active learning and four different calculations of learning gains on the cheetah question. The cheetah question was scored out of nine points, so a raw change of one is equivalent to earning one more point out of nine on the post-test than on the pre-test.