Supplemental Material

CBE—Life Sciences Education

Beck e*t al.*

Table S1: Studies used in meta-analysis of inquiry-based learning in laboratory courses

Reference #	Discipline	Inquiry type	Level	Assessment type
1	BCDGMB	Guided	Non-majors	Disciplinary content
2	BCDGMB	Guided	Upper-level	Qualitative
3	BCDGMB	Research	Introductory	Self-assessment, Disciplinary content
4	OB	Open-ended	Introductory	Qualitative
5	BCDGMB	Guided	Upper-level	Qualitative, Disciplinary content
6	BCDGMB, EEB	Guided	Non-majors	None
7	BCDGMB	Other	Introductory	Qualitative^
8	BCDGMB	Guided	Upper-level	Self-assessment, Disciplinary content, Other
9	BCDGMB	Guided	Upper-level	Qualitative, Self-assessment, Disciplinary content
10	BCDGMB	Guided	Upper-level	None
11	BCDGMB	Research	Upper-level	Qualitative, Self-assessment
12	BCDGMB	Open-ended	Introductory	Other*
13	EEB, OB	Guided	Non-majors	None
14	BCDGMB	Research	Upper-level	Qualitative

Reference #	Discipline	Inquiry type	Level	Assessment type
15	BCDGMB	Guided	Upper-level	Qualitative, Self-assessment, Disciplinary content
16	BCDGMB	Guided	Upper-level	Disciplinary content, Other
17	EEB	Research	Introductory	Self-assessment^, Other^
18	OB	Open-ended	Upper-level	Self-assessment, Other
19	BCDGMB	Guided	Introductory	None
20	BCDGMB	Research	Upper-level	Qualitative*, Disciplinary content*
21	BCDGMB	Research	Upper-level	Qualitative, Self-assessment
22	BCDGMB	Research	Non-majors	Qualitative
23	BCDGMB, EEB, OB	Guided	Introductory	Self-assessment*
24	OB	Open-ended	Non-majors, Upper-level	Self-assessment, Disciplinary content, Other
25	BCDGMB	Research	Upper-level	Qualitative
26	BCDGMB	Open-ended	Upper-level	None
27	OB	Guided	Not stated	None
28	BCDGMB	Open-ended, Guided	Upper-level	Qualitative*, Disciplinary content, Other
29	EEB	Guided	Introductory	None

Reference #	Discipline	Inquiry type	Level	Assessment type
30	OB	Open-ended	Upper-level	None
31	BCDGMB	Guided	Upper-level	Qualitative, Self-assessment, Disciplinary content, Other
32	BCDGMB	Guided	Introductory	Qualitative, Self-assessment
33	BCDGMB	Open-ended	Upper-level	Self-assessment*
34	BCDGMB	Guided	Upper-level	None
35	BCDGMB	Guided	Upper-level	Qualitative, Self-assessment, Disciplinary content
36	OB	Guided	Upper-level	None
37	OB	Other	Upper-level	Self-assessment*
38	EEB	Guided	Introductory	None
39	BCDGMB	Open-ended	Upper-level	Qualitative
40	BCDGMB, OB	Open-ended	Upper-level	Self-assessment, Disciplinary content^
41	EEB, OB	Guided	Introductory	Qualitative
42	BCDGMB	Open-ended	Upper-level	Qualitative, Self-assessment, Other
43	EEB, OB	Guided	Upper-level	Disciplinary content^

Reference #	Discipline	Inquiry type	Level	Assessment type
44	BCDGMB	Guided	Upper-level	Qualitative, Disciplinary content
45	BCDGMB	Guided	Upper-level	Self-assessment, Disciplinary content
46	BCDGMB	Research	Introductory	Qualitative, Other
47	BCDGMB	Open-ended	Introductory	Qualitative
48	BCDGMB	Research	Introductory	Qualitative, Other
49	BCDGMB	Guided	Introductory	Other
50	BCDGMB	Guided	Upper-level	None
51	OB	Guided	Upper-level	Disciplinary content, Other
52	BCDGMB	Research	Upper-level	Self-assessment*
53	OB	Open-ended	Upper-level	Qualitative^, Self-assessment^*
54	BCDGMB	Open-ended	Introductory	Self-assessment
55	OB	Guided, Open-ended	Upper-level	Other
56	BCDGMB	Guided	Introductory	None
57	BCDGMB	Open-ended	Upper-level	Disciplinary content

Reference #	Discipline	Inquiry type	Level	Assessment type
58	BCDGMB	Open-ended	Mixed	Self-assessment
59	BCDGMB, OB	Research	Upper-level	Qualitative, Other
60	BCDGMB, EEB	Open-ended	Mixed	Qualitative
61	EEB	Guided	Introductory	Qualitative, Disciplinary content, Other
62	BCDGMB, EEB	Guided	Introductory	Qualitative
63	BCDGMB, EEB, OB	Guided	Not stated	None
64	BCDGMB, OB	Research	Upper-level	Qualitative, Other
65	EEB, OB	Research	Not stated	None
66	BCDGMB	Guided	Mixed	Other
67	BCDGMB	Research	Upper-level	Self-assessment, Other*
68	BCDGMB	Guided	Upper-level	Qualitative, Self-assessment, Disciplinary content
69	BCDGMB	Research	Upper-level	Qualitative, Disciplinary content, Other
70	BCDGMB	Guided	Upper-level	None
71	BCDGMB	Research	Upper-level	Qualitative
72	BCDGMB	Guided	Upper-level	None

Reference #	Discipline	Inquiry type	Level	Assessment type
73	EEB, OB	Guided	Not stated	None
74	BCDGMB, EEB, OB	Guided	Non-majors	Qualitative^, Self-assessment^*, Disciplinary content^, Other^*
75	OB	Open-ended, Research	Upper-level	Qualitative, Disciplinary content^
76	BCDGMB	Research	Introductory	Qualitative^*, Disciplinary content^*
77	BCDGMB	Open-ended	Upper-level	Qualitative, Disciplinary content^
78	BCDGMB	Research	Upper-level	Qualitative, Self-assessment, Disciplinary content
79	BCDGMB	Research	Upper-level	Qualitative
80	BCDGMB	Open-ended	Not stated	Self-assessment*
81	BCDGMB, OB	Guided	Non-majors	None
82	BCDGMB	Open-ended	Upper-level	Qualitative
83	BCDGMB	Guided	Upper-level	Self-assessment*
84	BCDGMB, EEB, OB	Guided	Introductory	Other
85	OB	Guided	Introductory	Qualitative
86	BCDGMB	Research	Upper-level	Qualitative, Other

Reference #	Discipline	Inquiry type	Level	Assessment type
87	BCDGMB	Open-ended	Upper-level	Qualitative
88	BCDGMB	Open-ended	Upper-level	Qualitative, Other
89	BCDGMB	Guided	Not stated	None
90	BCDGMB, EEB	Open-ended	Introductory	None
91	BCDGMB	Open-ended	Upper-level	Self-assessment
92	EEB	Guided	Non-majors	None
93	BCDGMB	Research	Upper-level	Disciplinary content
94	BCDGMB	Guided	Upper-level	Qualitative
95	BCDGMB	Guided, Open-ended	Upper-level	Disciplinary content
96	BCDGMB	Research	Upper-level	None
97	OB	Open-ended	Upper-level	Qualitative, Self-assessment
98	EEB	Research	Non-majors	Other^*
99	BCDGMB	Guided	Upper-level	None
100	BCDGMB, OB	Guided, Open-ended	Upper-level	Qualitative, Disciplinary content, Other
101	EEB	Open-ended	Upper-level	Self-assessment

Reference #	Discipline	Inquiry type	Level	Assessment type
102	EEB	Open-ended	Upper-level	None
103	BCDGMB	Guided	Introductory	Self-assessment^, Disciplinary content^
104	EEB	Guided	Non-majors	Disciplinary content
105	OB	Other	Non-majors, Upper-level	Self-assessment, Disciplinary content
106	BCDGMB, EEB	Open-ended	Introductory	Self-assessment, Disciplinary content
107	BCDGMB	Research	Upper-level	Qualitative
108	BCDGMB	Guided	Upper-level	Qualitative
109	BCDGMB	Open-ended	Upper-level	None
110	OB	Open-ended	Upper-level	Qualitative, Self-assessment, Disciplinary content, Other
111	BCDGMB	Research	Not stated	Self-assessment*, Disciplinary content*
112	EEB	Guided	Mixed	Self-assessment^*, Disciplinary content^
113	BCDGMB	Research	Upper-level	Self-assessment, Disciplinary content
114	BCDGMB	Open-ended, Research	Upper-level	Self-assessment, Disciplinary content
115	BCDGMB	Guided	Introductory	Qualitative, Disciplinary content
116	OB	Guided	Introductory	Self-assessment, Disciplinary content, Other

Reference #	Discipline	Inquiry type	Level	Assessment type
117	OB	Guided	Upper-level	None
118	BCDGMB, EEB	Research	Upper-level	None
119	EEB	Guided	Upper-level	None
120	EEB, OB	Open-ended	Non-majors, Introductory, Upper-level	None
121	BCDGMB	Guided	Upper-level	Self-assessment
122	BCDGMB	Research	Introductory, Upper-level	Disciplinary content
123	OB	Other	Mixed	Qualitative, Disciplinary content
124	BCDGMB, EEB	Guided	Non-majors	Qualitative^
125	BCDGMB, EEB	Research	Upper-level	Qualitative
126	EEB, OB	Guided	Introductory	None
127	EEB, OB	Guided	Introductory	None
128	BCDGMB	Research	Introductory	Self-assessment, Disciplinary content
129	OB	Guided	Introductory	Disciplinary content
130	BCDGMB	Open-ended	Upper-level	Qualitative, Self-assessment, Other

Reference #	Discipline	Inquiry type	Level	Assessment type
131	BCDGMB	Open-ended	Upper-level	Self-assessment
132	BCDGMB	Guided	Upper-level	Qualitative
133	OB	Open-ended	Upper-level	Qualitative^, Other
134	BCDGMB	Guided	Upper-level	None
135	BCDGMB	Open-ended	Non-majors, Upper-level	Qualitative, Disciplinary content
136	BCDGMB, EEB	Guided, Open-ended	Non-majors	Self-assessment*
137	BCDGMB	Guided	Upper-level	Qualitative, Other
138	BCDGMB	Guided	Introductory	None
139	BCDGMB	Open-ended	Upper-level	None
140	OB	Guided, Open-ended	Introductory	Disciplinary content
141	OB, EEB	Open-ended	Not stated	None
142	BCDGMB	Guided, Open-ended	Upper-level	None

Note: Explanations for all categories can be found in the main article. Inquiry approaches coded as 'Other' include methods as case studies, problem-based learning, model building. Assessment types coded as 'Other' include measure of scientific reasoning, experimental design, information literacy, and statistical literacy. BCDGMB =Biochemistry, Cell biology, Developmental Biology, Genetics, and Molecular Biology; EEB = Ecology and Evolutionary Biology; OB = Organismal Biology (Plant and Animal Anatomy and Physiology). *Assessment based on a published instrument. ^Controlled Study

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