

Supplementary Material 1.
Meta-analyses on Flipped Learning

	1 st Author Pub Year	Title	Review Type	Papers Analyzed	Year Analyzed	Learner Group, Sample Size	Learning Outcomes	Results	Effect Size
1	Aydin 2021	The meta-analysis of the studies about the effects of flipped learning on students' achievement	Meta-Analysis	25	2014-2018	All learners	Academic Achievement	FL> traditional lecture	$g=0.71$ (large)
2	Chen 2018	Academic outcomes of flipped classroom learning: A meta-analysis	Meta-Analysis	46	2012-2016	Higher education N=9,026	Academic Achievement (Exam scores, Course grades, OSCE scores)	FL> traditional lecture (OSCE): No significance	$g=0.47$ (medium)
3	Cheng 2019	Effects of the flipped classroom instructional strategy on students' learning outcomes: A meta-analysis	Meta-Analysis	55	2013-2016	All learners N=7,912	Academic Achievement (Cognitive learning)	FL> traditional lecture (No significance)	$g=0.19$ (small)
4	Farmus 2020	The flipped classroom in introductory statistics: Early evidence from a systematic review and meta-analysis	Systematic Review & Meta-Analysis	10	2013-2019	Undergraduates (statistics) N=7,209	Academic Achievement	FL> traditional lecture	$g=0.43$ (medium)
5	Ge 2020	Effectiveness of flipped classroom vs traditional lectures in radiology education A meta-analysis	Meta-Analysis	19	2015-2019	Medical students N=2,114	Academic Achievement (Theoretical, Practical skills)	FL> traditional lecture	<i>theoretical performance</i> $g=1.12$ (large) <i>practical skills</i> $g=2.59$ (large)
6	Gillette 2018	A meta-analysis of outcomes comparing flipped classroom and lecture	Meta-Analysis	5	2014-2017	All learners N=1,395	Academic Achievement (Exam score)	FL> traditional lecture (No significance)	$g=0.19$ (small)
7	Hew 2018	Flipped classroom improves student learning in health professions education: a meta-analysis	Meta-Analysis	28	2012-2017	Health professions N=4,715	Academic Achievement, Affective (Satisfaction)	FL> traditional lecture	$g=0.33$ (medium)
8	Hu 2018	Effectiveness of flipped classrooms in Chinese baccalaureate nursing education: A meta-analysis of randomized controlled trials	Meta-Analysis	11	2015-2017	Chinese nursing students N=1,484	Academic Achievement (Theoretical, Practical skills)	FL> traditional lecture	<i>Theoretical knowledge</i> $g=1.06$ (large) <i>Practical skills</i> $g=1.40$ (large)

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9	Jang 2020	A meta-analysis of the cognitive, affective, and interpersonal outcomes of flipped classrooms in higher education	Meta-Analysis	43	2012-2017	Higher education	Academic Achievement (cognitive learning), Affective, Interpersonal	FL> traditional lecture	$g=0.35$ (medium)
10	Karagöl 2019	The effect of flipped learning approach on academic achievement: A meta-analysis study	Meta-Analysis	80	2012-2017	All learners	Academic Achievement	FL> traditional lecture	$g=0.41$ (medium)
11	Kozikoglu 2019	Analysis of the studies concerning flipped learning model: A comparative meta synthesis study	Meta-Analysis	80	2014-2017	Undergraduates	Academic Achievement, Affective (motivation)	FL> traditional lecture	-
12	Låg 2019	Does the flipped classroom improve student learning and satisfaction? A systematic review and meta-analysis	Systematic Review & Meta-Analysis	272	2020-2017	All learners	Academic Achievement (Continuous-learning, Pass/fail rates), Affective (satisfaction)	FL> traditional lecture	<i>Achievement</i> $g=0.35$ (medium) <i>Satisfaction</i> $g=0.16$ (small)
13	Li 2020	Flipped classroom improves nursing students' theoretical learning in China: A meta-analysis	Meta-Analysis	32	2015-2019	Chinese nursing students N=4,389	Academic Achievement (Theoretical)	FL> traditional lecture	$g=1.33$ (large)
14	Liu 2018	Effectiveness of the flipped classroom on the development of self-directed learning in nursing education: A meta-analysis	Systematic Review & Meta-Analysis	12	2010-2017	Nursing students N=1,440	Self-directed learning	FL>traditional lecture	No full-text
15	Lo 2019	The impact of flipped classrooms on student achievement in engineering education: A meta-analysis of 10 years of research	Meta-Analysis	29	2012-2017	K-12, Undergraduates (Engineering) N=5,329	Academic Achievement	FL> traditional lecture	$g=0.29$ (small)
16	Orhan 2019	The effect of flipped learning on students' academic achievement: A meta-analysis Study	Meta-Analysis	13	2015-2017	Secondary and undergraduates N=651	Academic Achievement	FL> traditional lecture	$g=0.74$ (large)
17	Shi 2020	College students' cognitive learning outcomes in flipped classroom instruction: A meta-analysis of the empirical literature	Meta-Analysis	33	2013-2017	Undergraduates N=6,947	Academic Achievement (Cognitive learning)	FL> traditional lecture	$g=0.53$ (medium)

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18	Shahnama 2021	A meta-analysis of relative effectiveness of flipped learning in English as second/foreign language research	Meta-Analysis	49	2014-2019	ESL/EFL students N=4,202	Academic Achievement	FL> traditional lecture	$g=1.24$ (large)
19	Strelan 2020	Student satisfaction with courses and instructors in a flipped classroom: A meta-analysis	Meta-Analysis	53	2013-2018	Secondary and Higher education N=8,429	Affective (Satisfaction with courses and instructors)	FL> traditional lecture	<i>courses</i> $g=0.36$ (medium) <i>Instructors</i> $g=0.40$ (medium)
20	Strelan 2020	The flipped classroom: A meta-analysis of effects on student performance across disciplines and education levels	Meta-Analysis	198	2012-2018	All learners N=33,678	Academic Achievement	FL> traditional lecture	$g=0.50$ (large)
21	Tutal 2021	Flipped classroom improves academic achievement, learning retention and attitude towards course: a meta-analysis	Meta-Analysis	203	2012-2019	All learners N=17,807	Academic Achievement (learning retention), Affective (Attitude)	FL> traditional lecture	<i>academic achievement</i> $g=0.76$ (large) <i>Attitude</i> $g=0.41$ (medium)
22	Vitta 2020	The flipped classroom in second language learning: A meta-analysis	Meta-Analysis	56	2006-2019	All learners (second language) N=4,220	Academic Achievement	FL> traditional lecture	$g=0.99$ (large)
23	Wagner 2021	Effectiveness of the flipped classroom on student achievement in secondary education: A meta-analysis	Meta-Analysis	25	All	All learners N=2,323	Academic Achievement	FL> traditional lecture	No full-text
24	Xu 2019	The effectiveness of a flipped classroom on the development of Chinese nursing students' skill competence: A systematic review and meta-analysis	Systematic Review & Meta- Analysis	22	2015-2018	Chinese nursing students N=4,295	Academic Achievement (Practical skills)	FL> traditional lecture	$g=1.79$ (large)
25	Zheng 2020	The effectiveness of the flipped classroom on students' learning achievement and learning motivation: A meta-analysis	Meta-Analysis	95	2013-2019	All learners N=15,386	Academic Achievement, Affective (Motivation)	FL> traditional lecture	<i>Achievement,</i> <i>motivation</i> $g=0.66$ (medium)

Supplementary Material 2.

Review Studies on Flipped Learning (systematic/scoping review & meta-analysis)

	1 st Author Pub Year	Title	Review Type	Papers Analyzed	Year Analyzed
1	Algayres 2020	Learning analytics in flipped classrooms: A scoping review	Systematic Review	49	2014-2019
2	Arslan 2020	A systematic review on flipped learning in teaching English as a foreign or second language	Systematic Review	78	2014-2018
3	Aydin 2021	The meta-analysis of the studies about the effects of flipped learning on students' achievement	Meta-Analysis	25	2014-2018
4	Betihavas 2016	The evidence for 'flipping out': A systematic review of the flipped classroom in nursing education	Systematic Review	5	2013-2015
5	Bond 2020	Facilitating student engagement through the flipped learning approach in K-12: A systematic review	Systematic Review	107	2012-2018
6	Chen 2018	Academic outcomes of flipped classroom learning: A meta-analysis	Meta-Analysis	46	2012-2016
7	Chen 2017	A systematic review of the effectiveness of flipped classrooms in medical education	Systematic Review	9	2012-2016
8	Cheng 2019	Effects of the flipped classroom instructional strategy on students' learning outcomes: A meta-analysis	Meta-Analysis	55	2013-2016
9	Evans 2019	Flipping the classroom in health care higher education: A systematic review	Systematic Review	24	2012-2017
10	Farmus 2020	The flipped classroom in introductory statistics: Early evidence from a systematic review and meta-analysis	Systematic Review & Meta-Analysis	10	2013-2019
11	Fung 2021	Systematic literature review of flipped classroom in mathematics	Systematic Review	12	2012-2017
12	Ge 2020	Effectiveness of flipped classroom vs traditional lectures in radiology education A meta-analysis	Meta-Analysis	19	2015-2019
13	Gianoni-Capenakas 2019	Effectiveness and perceptions of flipped learning model in dental education a systematic review	Systematic Review	8	2012-2018
14	Gillette 2018	A meta-analysis of outcomes comparing flipped classroom and lecture	Meta-Analysis	5	2014-2017
15	Hamzah 2021	Flipped classroom in programming course: A systematic literature review	Systematic Review	32	2015-2019
16	Hew 2018	Flipped classroom improves student learning in health professions education: a meta-analysis	Meta-Analysis	28	2012-2017
17	Hu 2018	Effectiveness of flipped classrooms in Chinese baccalaureate nursing education: A meta-analysis of randomized controlled trials	Meta-Analysis	11	2015-2017
18	Jang 2020	A meta-analysis of the cognitive, affective, and interpersonal outcomes of flipped classrooms in higher education	Meta-Analysis	43	2012-2017
19	Jiang 2020	A scoping review on flipped classroom approach in language education: challenges, implications and an interaction model	Scoping Review	33	2015-2018
20	Karabulut-Ilgu 2018	A systematic review of research on the flipped learning method in engineering education	Systematic Review	62	2003-2014

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21	Karagöl 2019	The effect of flipped learning approach on academic achievement: A meta-analysis study	Meta-Analysis	55	2012-2017
22	King 2019	Flipping the classroom in graduate medical education: A systematic review	Systematic Review	22	2014-2018
23	Koh 2019	Four pedagogical dimensions for understanding flipped classroom practices in higher education: A systematic review	Systematic Review	51	2013-2018
24	Kozikoglu 2019	Analysis of the studies concerning flipped learning model: A comparative meta synthesis study	Meta-Analysis	80	2014-2017
25	Låg 2019	Does the flipped classroom improve student learning and satisfaction? A systematic review and meta-analysis	Systematic Review & Meta-Analysis	272	2020-2017
26	Lencastre 2020	A systematic review on the flipped classroom model as a promoter of curriculum innovation	Systematic Review	11	2014-2018
27	Li 2020	Flipped classroom improves nursing students' theoretical learning in China: A meta-analysis	Meta-Analysis	32	2015-2019
28	Li 2020	The effectiveness of flipped classroom in health professions education in China: A systematic review	Systematic Review	59	2014-2019
29	Liu 2018	Effectiveness of the flipped classroom on the development of self-directed learning in nursing education: A meta-analysis	Systematic Review & Meta-Analysis	12	2010-2017
30	Lo 2019	The impact of flipped classrooms on student achievement in engineering education: A meta-analysis of 10 years of research	Meta-Analysis	29	2012-2017
31	Lo 2017	A critical review of flipped classroom challenges in K-12 education: possible solutions and recommendations for future research	Systematic Review	15	2013-2016
32	O'Flaherty 2015	The use of flipped classrooms in higher education: A scoping review	Scoping review	28	2000-2014
33	Orhan 2019	The effect of flipped learning on students' academic achievement: A meta-analysis study	Meta-Analysis	13	2015-2017
34	Özbay 2021	Effectiveness of flipped classroom teaching models in nursing education: A systematic review	Systematic Review	24	2013-2020
35	Park 2021	Strategies for flipped learning in the health professions education in south Korea and their effects: A systematic review	Systematic Review	10	2017-2019
36	Rasheed 2020	Self-regulated learning in flipped classrooms: A systematic literature review	Systematic Review	14	2010-2019
37	Sait 2017	Advances in medical education and practice: Student perceptions of the flipped classroom	Scoping Review	26	2012-2016
38	Shahnama 2021	A meta-analysis of relative effectiveness of flipped learning in English as second/foreign language research	Meta-Analysis	49	2014-2019
39	Shi 2020	College students' cognitive learning outcomes in flipped classroom instruction: A meta-analysis of the empirical literature	Meta-Analysis	33	2013-2017
40	Strelan 2020	Student satisfaction with courses and instructors in a flipped classroom: A meta-analysis	Meta-Analysis	53	2013-2018

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41	Strelan 2020	The flipped classroom: A meta-analysis of effects on student performance across disciplines and education levels	Meta-Analysis	198	2012-2018
42	Turan 2020	Flipped classroom in English language teaching: A systematic Review	Systematic Review	43	2014-2018
43	Tutal 2021	Flipped classroom improves academic achievement, learning retention and attitude towards course: a meta-analysis	Meta-Analysis	203	2012-2019
44	Vanka 2019	Flipped classroom in dental education: A scoping review	Scoping review	17	2012-2019
45	Vitta 2020	The flipped classroom in second language learning: A meta-analysis	Meta-Analysis	56	2006-2019
46	Voronina 2017	Systematic review and results of the experiment of a flipped learning model for the courses of descriptive geometry, engineering and computer graphics, computer geometry	Systematic Review	21	2003-2017
47	Wagner 2021	Effectiveness of the flipped classroom on student achievement in secondary education: A meta-analysis	Meta-Analysis	25	All
48	Xu 2019	The effectiveness of a flipped classroom on the development of Chinese nursing students' skill competence: A systematic review and meta-analysis	Systematic Review & Meta- Analysis	22	2015-2018
49	Youhasan 2021	Exploring the pedagogical design features of the flipped classroom in undergraduate nursing education: a systematic review	Systematic Review	27	2013-2019
50	Zainuddin 2019	A systematic review of flipped classroom empirical evidence from different fields: what are the gaps and future trends?	Systematic Review	48	2017-2018
51	Zheng 2020	The effectiveness of the flipped classroom on students' learning achievement and learning motivation: A meta-analysis	Meta-Analysis	95	2013-2019
52	Zou 2020	A systematic review of research on flipped language classrooms: theoretical foundations, learning activities, tools, research topics and findings	Systematic Review	34	2015-2019