

A META-ANALYSIS ON THE EFFECT OF REMOTE COMPARED TO F2F INSTRUCTION ON STUDENT OUTCOMES DURING THE COVID-19 PANDEMIC

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Background

94% of world student population (1.5 billion students) impacted by school closures due to the COVID-19 pandemic.

United Nations Educational, Scientific, and Cultural Organization (UNESCO)

Daily global monitoring by region and country

Variance in disruption by location and region

Literature Review

Abrupt shift to online learning created surge in educational research

Early Studies – Projected learning loss

Later studies – Empirical data on attitudes, achievement, and motivation

One systematic review examined empirical data

Variance in learning loss

Subject, location, grade level

Without consideration for learning modality

This study aims to expand previous research to assess impact of instruction modality on student outcomes during the COVID-19 pandemic

Research Question

Is there a difference between face-to-face and online instruction on student outcomes during the COVID-19 pandemic?

Methodology

Coding categories

Location: country; Grade level: K-12 or high education; Subject: Instructional subject area; Outcome: academic achievement or student motivation/engagement; Research design; Sample size; Mean and standard deviation; Effect size: reported or computed

Effect size computation

All reported or computed as Cohen's *d*

Campbell Collaboration effect size calculator

Outcome variables

Student academic achievement; Student motivation/engagement

Moderators

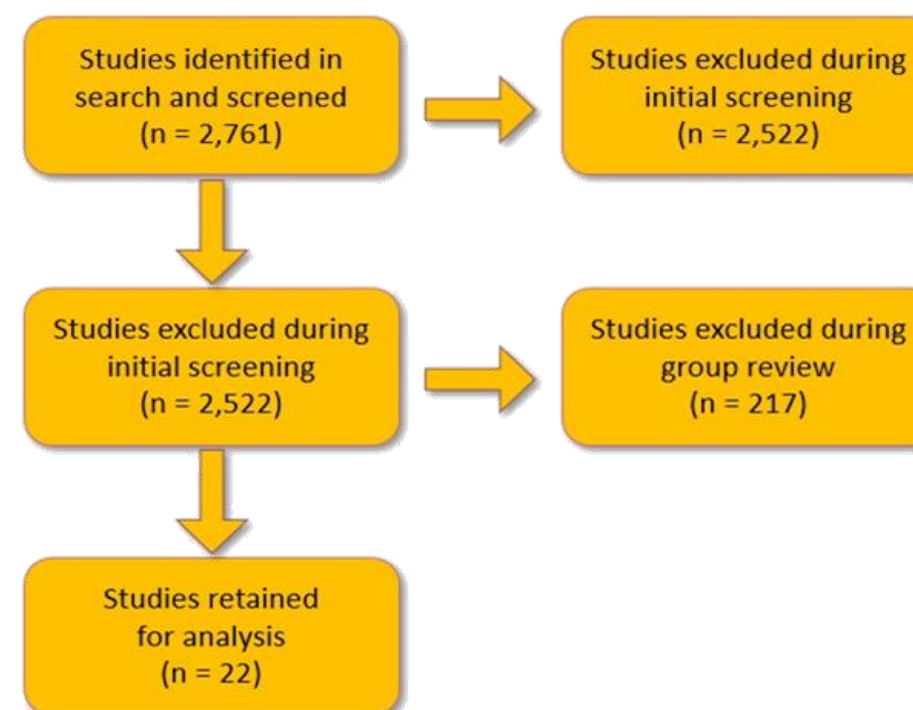
Location (country); Grade level (K-12 or higher education); Subject area (e.g., mathematics, reading/language arts, science, education, and business)

Analysis

Metafor package in R

Study Selection

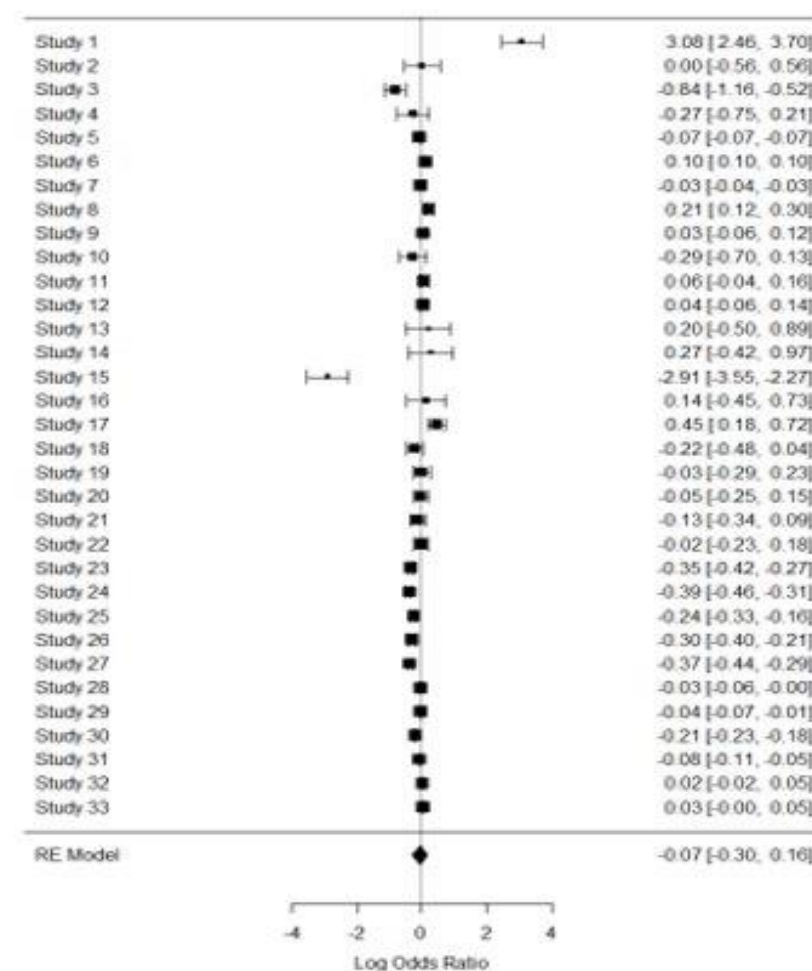
CATEGORY	TERMS
Population	Student, K-12, higher education
Intervention	Online learning, virtual
Comparison Group	Face-to-face, in-person learning
Outcomes	Academic achievement Motivation
Study Design	Experimental, Quantitative



Results

Academic Achievement

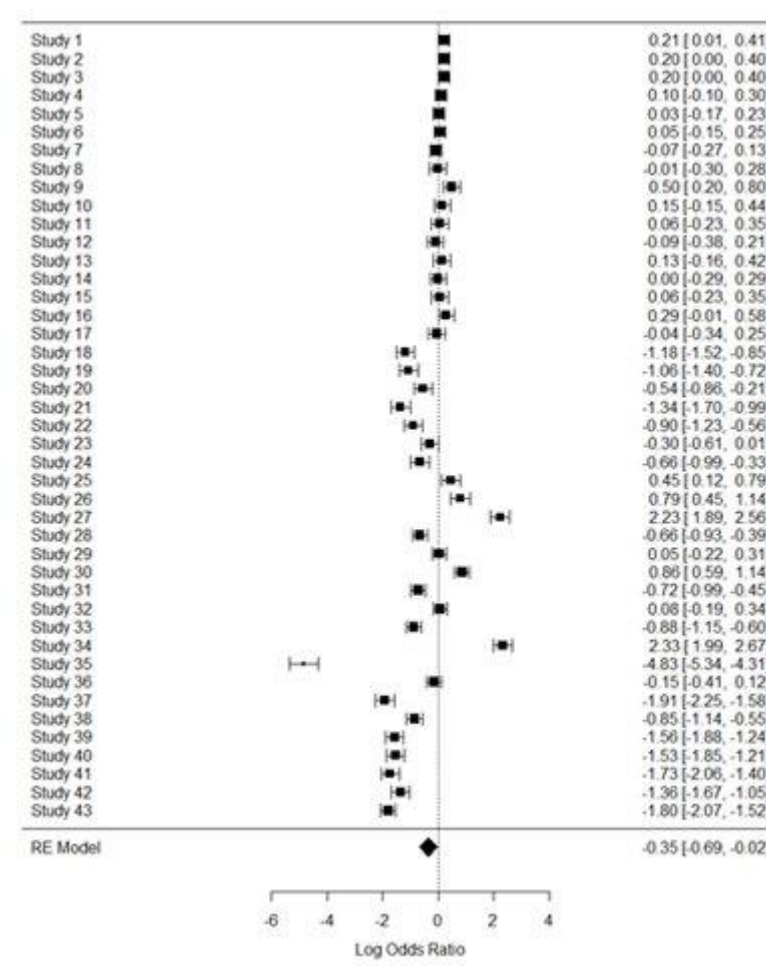
Estimated effect sizes ranged from -2.91 to 3.08, represents a trivial negative effect. The test for heterogeneity was significant. Publication bias against studies with small sample sizes. 12 studies were added to the simulation, there are potentially missing data. The moderators did not account for any of the total variability.



Academic Achievement (n=33, Cohen's *d*=-0.07)

Motivation/Engagement

Estimated effect sizes ranged from -4.83 to 2.33, represents a small to moderate negative effect. The test for heterogeneity was significant. Publication bias against studies including a range of sample sizes from small to large, this study may benefit from the inclusion of additional unpublished studies. No additional studies were added to the simulation. The moderator (country) was significant.



Motivation/Engagement (n=43, Cohen's *d*=-0.35)

Conclusion

Online learning had slightly lower levels of academic achievement than in F2F.

None of the included moderators explained any of the variance in effect size estimates across studies.

Online learning demonstrated lower levels of motivation than those learning F2F.

Study location and grade level moderators were statistically significant in explaining some of the variance in effect sizes.

3 countries had + coefficients ranging from 1.34 to 2.11, suggesting that motivation in these countries for online students is nearly 1.5 to 2 times greater than for students in US.

As compared to K-12 students, higher education students showed motivation 1.5 times lower than learning in an online environment.

Limitations

Quality of the studies: Rush to publish during this unprecedented time
Type of assessments used (may explain why a difference was found in motivation – standardized instruments)

Publication bias: Conference presentations were not available

Limitations of the moderators: Grade-level had to be dichotomized as either K-12 or higher education

Time frame was not included (i.e., March – June 2020 vs. After August 2020)

Sub-group analysis is needed

References

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