

Effectiveness of Online: An Overview of the Research Evidence

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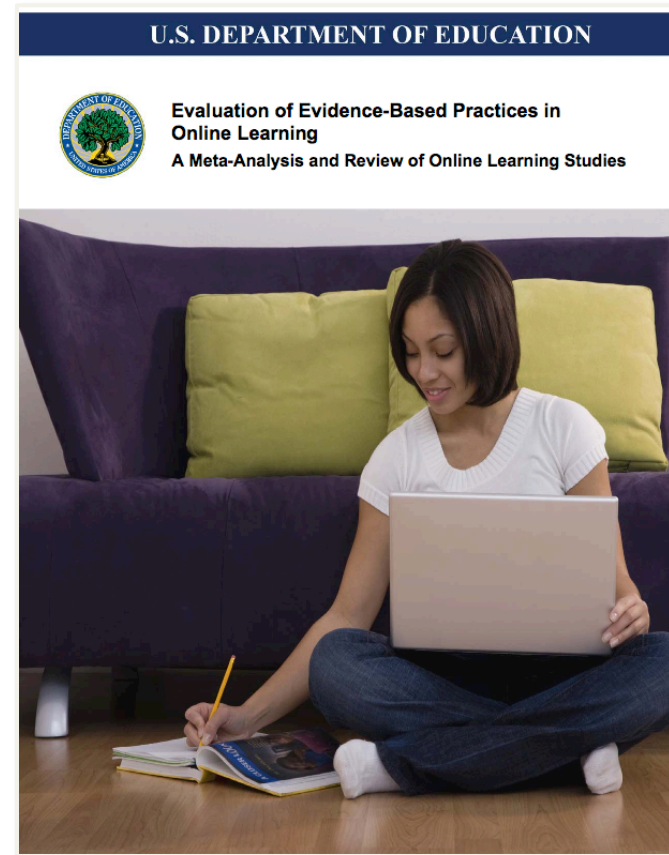
SRI's Systematic Search of the OLL Literature

- Studies of online learning from 1996 through July 2008
- Fully online and blended treatments analyzed separately
- Inclusion criteria
 - compared a fully online or blended condition to face-to-face instruction
 - measured learning objectively with the same measure for treatment and control groups
 - used an experimental or quasi-experimental design with control for any pre-existing differences between groups
 - provided the statistical information needed to compute an effect size

Means, Toyama, Murphy, & Bakia. (Forthcoming). The effectiveness of online and blended learning. *Teachers College Record*.

SRI's meta-analysis of online learning research

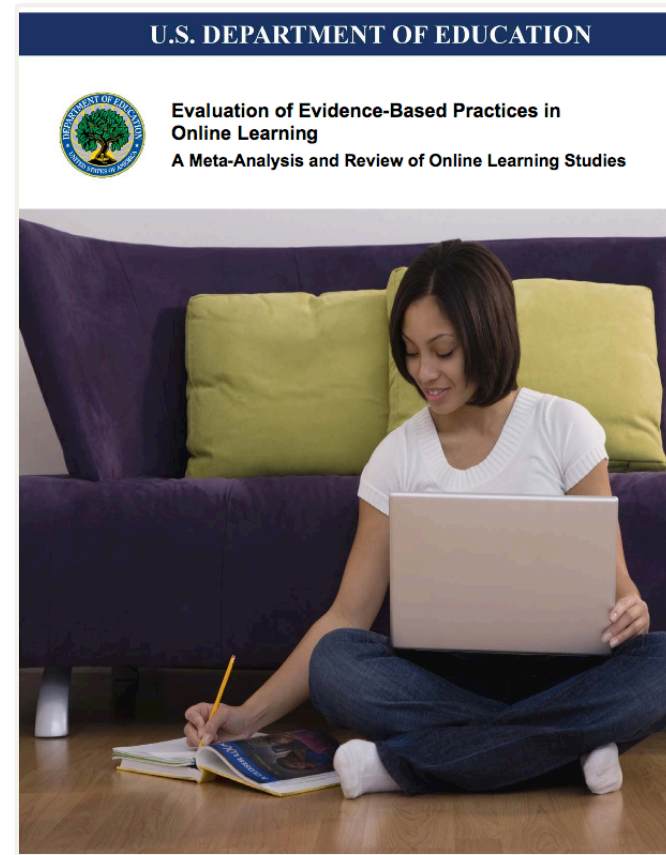
- 1,132 articles reviewed
- 99 online learning effectiveness studies measured student learning objectively in an experimental or quasi-experimental design
- 45 of these included information needed to compute effect size, yielding 50 contrasts for meta-analysis
- Only 5 studies, yielding 7 effects, involved K-12 students.



www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

Meta-Analysis of Online Learning: Nature of the Studies in the Analysis

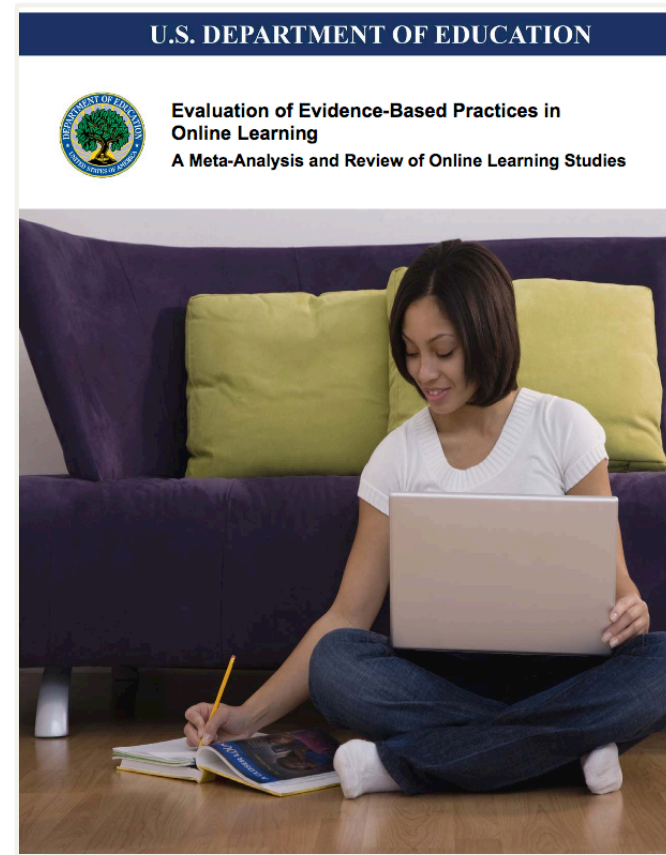
- Studies were about evenly split between those involving college or younger students and those with learners in graduate programs or professional training.
- Average learner age varied from 13 to 44.
- Nearly all studies involved formal education; the most common subject was medical/health care.
- Sample sizes ranged from 16 to 1,857 students, but only five studies had 400 or more learners.
- 19 of the studies involved time frames of less than a month, but the majority were of longer duration.



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Meta-Analysis of Online Learning: A Closer Look

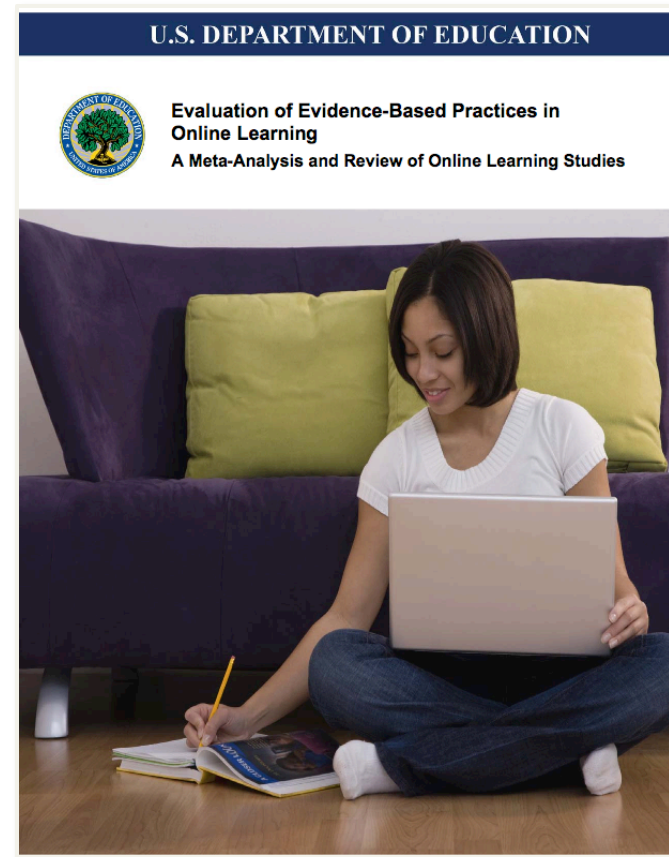
- Mean effect size for 27 contrasts of purely online and purely face-to-face instruction was +0.05, no significant difference
- Mean effect size for 23 contrasts between blended and purely face-to-face instruction was +0.35, $p < .0001$.
- Individual study effect sizes varied from -0.80 to +1.11, suggesting the importance of factors other than learning medium per se



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Advantage over face-to-face instruction was larger for studies . . .

- using blended approaches than for studies using pure online learning
- where learning was predominantly instructor-led or collaborative rather than completely independent
- in which the content and instructional approach differed between the online/blended and face-to-face conditions



Taken as a whole, the findings suggest that the observed advantage of blended learning is a product of redesigning the learning experience, not of the medium per se.



Implications for practice from meta-analyses

- Purely independent forms of online learning appear less effective than those with teacher involvement and/or collaboration with peers (Means et al., 2010).
- When blended learning was more effective than conventional instruction, it incorporated additional kinds of learning resources and activities (Means et al., 2010).
- Online learning produces more positive effects when teachers are neither dominant nor inactive (Zhao et al., 2005).
- The amount of interaction learners have with online content is the strongest predictor of learning outcomes (Bernard et al., 2009).



K-12 Impact Studies Published Since the SRI Meta-Analysis

- Northeast Lab Study of Online Algebra I (2011)
- Study of Cognitive Tutor for Geometry (Pane et al., 2010)
- SRI Analysis of Florida Virtual School Outcomes (Bakia et al., 2011)
- NEPC analysis of virtual cyber school outcomes (Miron & Urschel, 2012)

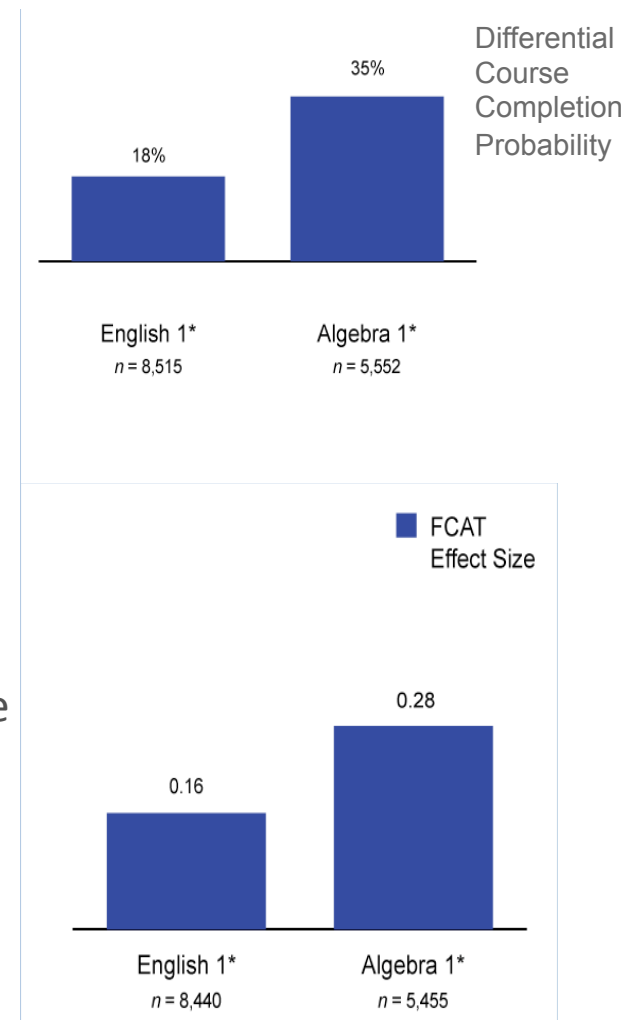


Higher Education Impact Studies Published Since the SRI Meta-Analysis

- OLI Statistics Studies (Lovett, Meyer, & Thille, 2008 and Bowen et al., 2012)
- NBER Experiment (Figlio, Rush & Yin, 2010)
- Community College WA secondary analyses (Xu & Jagers, 2011)
- CC Virginia secondary analyses (Jagers & Xu, 2011)

SRI's analysis of Florida Virtual School data

- Compared outcomes for students taking English or Algebra I through Florida Virtual School (FLVS) to those taking the same courses in regular classrooms in SY2006-07 or SY2007-08 after controlling for prior achievement.
- Found that compared to students taking classroom versions of these courses, FLVS students
 - had better odds of passing the course
 - earned higher course grades
 - scored higher on the state achievement test in the relevant subject taken in the spring of the year they took the course

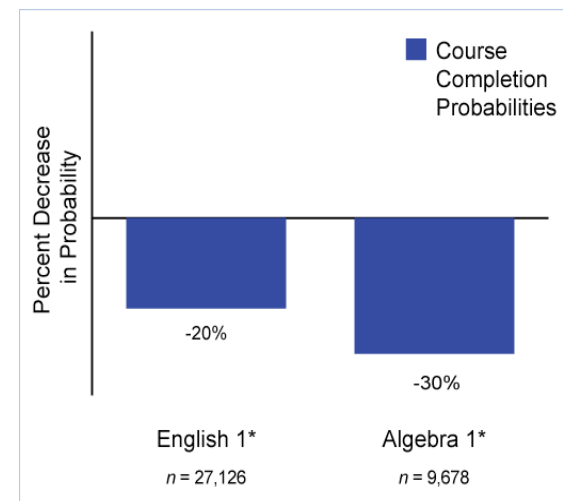


Source: Bakia et al., 2011

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But. . .

- The higher achievement of students in online English 1 and Algebra 1 was partially explained by differential attrition after the first semester.
- Students enroll in FLVS courses one semester at a time, and those who do not complete the first semester are unlikely to enroll in the second.
- When the comparison was made at the end of the first semester rather than at the end of the year, students in conventional classes completed the semester more often and had higher semester grades than students in online courses.



Source: Bakia et al., 2011

<http://ctl.sri.com/publications/displayPublication.jsp?ID=902>



Key Challenges for Evaluating the Effectiveness of Online and Blended Learning

- Categories are ill-defined, interventions are diverse, and both technology and practice are changing rapidly.
- It's difficult to get apple-to-apples comparisons.
- It's difficult to get the same valid, reliable learning outcome measure for students receiving different versions of instruction.
- Cost data are rarely collected and combined with outcome data in a way that supports decision making.

Dimensions of Online Learning

MEDIUM	Fully Online	Blended Online & Face-to-Face		
SCOPE OF INSTRUCTION Using Online	Unit/Lesson	Course	Entire Curriculum	
LOCATION	School	Home	Other/Mix	
TIME	Fixed Schedule	Schedule with Flexibility	Open Entry/Open Exit	
GRADE LEVEL	Elementary	Middle/ Secondary	Postsecondary	Other/Adult
CONTENT FOCUS	Procedural Skills	Conceptual Knowledge	Metacognitive Skills	Mix
ONLINE TEACHER ROLE	Teacher Leads Instruction	Teacher Supports Instruction	No Teacher Involvement	
STUDENT-STUDENT INTERACTION ONLINE	High	Moderate	Low	
STUDENT TO TEACHER RATIO	Traditional Classroom Ratio	2-3 Times Traditional Classroom Ratio	Instructional Helpdesk Model	

Sources: Some categories adapted from Michigan Virtual University and INACOL.



Takeaways

- There are many different models of online and blended learning—we need to avoid oversimplistic statements about it “working” or “failing.”
- Effectiveness research is needed on different types of online learning.
- Purely online learning works well for some students, but a sizable proportion drop out mid-course.
- Developmental education and credit recovery programs report the importance of having face-to-face contact with an instructor who will support the student’s learning online.
- Large-scale online learning interventions should be set up with the capability to report outcomes for both treatment and control or baseline comparison groups.

Thank You



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