

Understanding Research on Blended Learning Programs

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REL Central: Who We Are



The Regional Educational Laboratory (REL) Central at Marzano Research serves the applied education research needs of Colorado, Kansas, Missouri, Nebraska, North Dakota, South Dakota, and Wyoming.

REL Central: Colorado School Improvement Research Partnership

A partnership united by goals to support school improvement efforts throughout Colorado in order to improve student learning outcomes.

Areas of Focus



Program
evaluation



Cost
analysis



Data
use

Colorado Department of Education Blended Learning
Initiative



Research questions

Handout A

- Which remote/online models support positive outcomes for students?
- How are remote/online models implemented? How do models define synchronous and asynchronous learning?
- What resources are related to successful implementation?



Which remote/online models support positive outcomes for students?

This question can be answered to varying degrees of certainty

- **Highest level of certainty:** Well-designed research studies that compare the outcomes for a group of students who receive remote/online instruction to the outcomes for a **similar** group of students who receive face-to-face instruction.
 - Randomized controlled trials [RCTs] or Quasi-experimental designs [QEDs]
- **Less certainty:** Studies that use correlational or descriptive designs, provide information on which models support positive outcomes for students, but the outcomes should be interpreted with caution.
 - Students who select into fully remote options may have behavioral, social, or health challenges, and therefore as a group they may have lower student achievement.
 - For example, if a student is diagnosed with a chronic disease and this diagnosis leads to the student switching to a virtual school and also leads to decreased performance by the student, it would be difficult to say that the student's performance was solely due to the student attending a virtual school.

Types of studies reviewed

- Meta-analyses of QEDs and RCTs of remote/online learning programs
 - Three research reports from the past two decades combined the results of many studies using meta-analytic techniques to determine the overall impact of remote/online programs on student achievement.
 - Included studies of remote/online learning programs rather than looking at virtual schools where students' entire education is provided in an online setting.
- Individual studies of virtual schools
 - Three studies examined student outcomes in virtual schools in states that offer fully online statewide virtual schools.

Remote/online learning programs can have a positive significant impact on student achievement

Distance learning programs (fully online) had a **significant positive effect on ELA achievement** but not on mathematics achievement (Sahni et al., 2021).

- **Studies from:** 2010–2021
- **Grade level:** K–12
- **Subjects:** English language arts, mathematics
- **Number of studies:** 9
- **Review of research design:** Met WWC standards

Online education (fully online or blended) had a **positive but not significant effect** on student achievement (Hulum, 2020).

- **Studies from:** 2010–2021
- **Grade level:** Primary education level
- **Subjects:** Art, biology, information and communications technology, English, math, nature, science, social sciences
- **Number of studies:** 27 (all countries), 4 (U.S.)
- **Review of research design:** No review

Online classes (fully online or blended) had a **significant positive effect** on student learning (Means et al., 2010, 2013).

- **Studies from:** 1996–2008
- **Grade level:** K–12, higher education
- **Subjects:** Business, computer science, languages, mathematics, medicine/healthcare, science, social sciences, teacher education
- **Number of studies:** 50 (all grade levels); 7 (K–12)
- **Review of research design:** No review

There is limited evidence that different practices or approaches are associated with more effective **remote/online learning**

- Two reports found no differences between different approaches.^{1,2}
- One report found three practices associated with greater effects.³
 - Blended learning (online and face-to-face) was associated with greater effects than online-only learning for K–12 and higher education students.
 - Collaborative or instructor-directed instruction was associated with greater effects than independent active online learning for K–12 and higher education students.
 - More time spent on task was associated with greater effects for higher education students.



There is limited evidence on the effectiveness of **virtual schools**

- Two studies compare the achievement of a similar group of students enrolled in online versus brick-and-mortar schools.^{4,5}
 - Students attending virtual schools showed less academic growth
 - Students who were enrolled in virtual charter schools had lower achievement in math, English language arts, science, and social studies
 - The authors caution that they cannot completely account for characteristics of students who self-select into fully virtual schools.
- One study describes the graduation rates and state performance results for online schools and presents the national graduation rates as a comparison.⁶ For that study, the graduation rate of students in virtual schools was less than the national average graduation rate.
 - The study did not include any statistical analyses to compare results.

There is limited evidence that different practices or approaches are associated with more effective **virtual schools**.

- Only one of the previous studies examined whether different approaches are associated with more effective virtual schools.⁴
 - The amount of synchronous instruction was not related to reading or math achievement.
 - Schools offering entirely self-paced courses had stronger growth in reading compared to schools not offering self-paced courses.
 - Middle and high schools with smaller average class sizes had greater reading and math achievement. The analyses did not determine an optimal class size.
 - Schools that did not formally monitor the interactions between teachers and families saw less math academic growth compared to schools that had a school administrator, lead teacher, or other staff member monitor the interactions.

How are remote/online models implemented?

Categories of remote/online learning models⁷

Category	Features
Virtual schools	<ul style="list-style-type: none"> • Students fully online using an online instructional model. Mostly asynchronous with some synchronous lessons.
Hybrid schools	<ul style="list-style-type: none"> • Has a physical location for regular instructional purposes, but most do not have a traditional school schedule. Students take online instruction and have onsite instruction.
Online courses with online teachers or proctors	<ul style="list-style-type: none"> • Provides the entire course curriculum through online content. Students take the course online but take remaining courses at a brick-and-mortar school. Teacher or proctor is online only and communicates with students virtually. Mostly asynchronous with some synchronous lessons.
Online courses with onsite teachers or proctors	<ul style="list-style-type: none"> • The entire course content is provided and housed in an online platform. Students attend the course onsite to access the online content. Onsite teacher works with students one-on-one or in small groups.
Digital content and skills software	<ul style="list-style-type: none"> • Supplemental programs that include online curriculum or materials that do not include the full scope and sequence of a for credit course.

How do models define synchronous and asynchronous learning?

- Synchronous learning involves real-time engagement between students and teachers. This requires continuous live Internet and video meetings may be used for class meetings or individual meetings.
- Asynchronous learning occurs when teachers and students are not online at the same time. Online materials may be used, but there are no regular meeting times and generally students can set their own schedules.



Individual online courses with in-person or online teachers

<p>Examples of online courses with online teachers</p>	<ul style="list-style-type: none"> • Asynchronous or synchronous high school dual credit courses offered by local universities (Smalley, 2012). • Online summer middle school math course over 10 weeks (Lynch & Kim, 2017). • Virtual world learning environment for high school foreign language courses (Jacob, 2021). • Unit-based course for high school students, focused on learning information technology and 21st century skills (Izzo, 2010). • Credit recovery Algebra I course for grade 9 students, offered online or in person (Heppen, 2017).
<p>Example research findings related to student achievement</p>	<ul style="list-style-type: none"> • No differences between online versus in-person achievement outcomes were found through online math course for high school students (Lynch & Kim, 2017). • Academic achievement, as assessed class grades and completion rates were higher for students who took synchronous classes versus their peers who took asynchronous classes (Smalley, 2012). • No differences in student achievement between those who took Algebra I credit recovery in person or virtually.

<p>Examples of online courses with onsite teachers or proctors</p>	<ul style="list-style-type: none"> • Science instruction for English learners and those with learning difficulties. Students are onsite accessing an online curriculum with a teacher who guides their instruction (Terrazas-Arellanes et al., 2017). • Online algebra course with an onsite proctor (Heppen et al., 2011). • Online, quest-style games that provide asynchronous learning (Zeglen & Rosendale, 2018). • Online games, which support and enhance onsite learning (Mulqueeny, 2015).
<p>Example research findings related to student achievement</p>	<ul style="list-style-type: none"> • Students in blended learning environments, where they had the opportunity to interact with peers and teachers performed significantly better on factual knowledge than those in the online learning environment (Chen, 2012). • Students taking the online algebra course had higher general math achievement and more advanced course-taking than students who took regular grade 8 courses that taught algebra content (Heppen et al., 2011).

What resources are related to successful implementation?

Resources related to successful implementation of remote learning^{8,9}

Resource	Features
Technology infrastructure and support	<ul style="list-style-type: none"> • Ensure that students have Internet-enabled devices and adequate Internet connectivity to access course materials and to interact with teachers and classmates. • Create an IT position (group of people) whose sole responsibility is to support tech needs for students, families, and teachers. • Provide explicit resources about technology use; be accessible when families and teachers need troubleshooting.
Engaging and flexible instruction	<ul style="list-style-type: none"> • Determine if synchronous, asynchronous, or a combination of both is most feasible. Synchronous learning can be beneficial in providing real-time engagement, attention, and support between students and teachers. Asynchronous learning can be beneficial in providing student access, flexibility, convenience, and personalization. • Make clear connections between synchronous and asynchronous activities. • Limit remote lectures to 10 minutes or less. • Use activities that require students' involvement.
Staffing and professional development	<ul style="list-style-type: none"> • Support teachers as they learn how to integrate digital tools and content into their classrooms. • Identify and provide immediate professional development needs for staff. • Emphasize teachers' unique strengths, provide leadership roles, and invest in teachers' success.
Family engagement and support	<ul style="list-style-type: none"> • Provide resources for parents to help their children learn in a blended environment. Resources may include guidance on using digital platforms, online tutoring solutions, and health and safety tips. • Use multiple modes to keep families informed and connected with the school (e.g., phone calls, weekly emails, texts, resources, surveys). • Make explicit connections and partnerships between community resources and families.
Extracurricular activities	<ul style="list-style-type: none"> • Use existing resources to support participation in non-classroom activities such as virtual field trips, exploring nature, and scavenger hunts. • Have students lead extracurricular offerings and then support them with resources and supports to bring ideas to fruition.
Social-emotional learning	<ul style="list-style-type: none"> • Provide virtual office hours for students to interact with teachers and build supportive relationships in blended learning environments. • Provide additional social-emotional support for students who may have less motivation and more distractions in blended learning environments, such as high school students. • Carve out time to support students' needs such as holding virtual meetings, journaling time, video/audio entries, etc. • Assign each teacher a small number of students to check on individually and meet collectively. Can be coffee clubs, current event check-in, etc. (student-led works best). • Make spaces safe, open, nondefensive, and nonjudgmental.

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