AIR®
American Institutes for Research®

UCHICAGO Consortium on School Research

Getting Back on Track

The Effect of Online Versus Face-to-Face Credit Recovery in Algebra I on High School Credit Accumulation and Graduation

RESEARCH BRIEF 5

June 2017

AUTHORS OF THIS RESEARCH BRIEF are Jordan Rickles (American Institutes for Research [AIR]), Jessica Heppen (AIR), Elaine Allensworth (The University of Chicago Consortium on School Research [Consortium]), Nicholas Sorensen (AIR), Kirk Walters (AIR), and Peggy Clements (AIR).

THE ***BACK ON TRACK STUDY*** is an investigation about credit recovery in Algebra I for students who fail the course in ninth grade. Students who fail Algebra I are required to recover the credit during high school to earn a diploma, and online credit recovery courses have become a popular strategy in schools and districts around the country. The *Back on Track Study* examines the impact of an online credit recovery Algebra I course compared with a standard face-to-face version of the course; both courses were offered the summer after ninth graders failed Algebra I. The study was funded by the U.S. Department of Education's Institute of Education Sciences, and it was conducted by American Institutes for Research and the University of Chicago Consortium on School Research, in partnership with Chicago Public Schools (CPS). This study is a randomized controlled trial that was designed to address two types of questions:

1. **What is the impact of online versus face-to-face Algebra I courses for credit recovery?**
2. **What is the long-term effect of offering expanded credit recovery options early in high school?**

The study took place in 17 CPS high schools that offered both online and face-to-face Algebra I credit recovery courses in summer 2011 and summer 2012. A total of 1,224 ninth graders participated in the study by enrolling in a second-semester Algebra I course for credit recovery during the summer after failing the class. Students were randomly assigned to take the online or face-to-face course.

This research brief is one in a series for the *Back on Track Study* that presents the findings regarding the relative impact of online versus face-to-face Algebra I credit recovery on students' academic outcomes, aspects of implementation of the credit recovery courses, and the effects over time of expanding credit recovery options for at-risk students.

RESEARCH BRIEFS IN THIS SERIES

Getting Back on Track: Comparing the Effects of Online and Face-to-Face Credit Recovery in Algebra I

Getting Back on Track: The Role of In-Person Instructional Support for Students Taking Online Credit Recovery

Getting Back on Track: Who Needs to Recover Algebra Credit After Ninth Grade?

Getting Back on Track: What Math Content Is Taught and Learned in Online and Face-to-Face Algebra Credit Recovery Courses?

Getting Back on Track: The Effect of Online Versus Face-to-Face Credit Recovery in Algebra I on High School Credit Accumulation and Graduation

Getting Back on Track: Course Progression for Students Who Fail Algebra I in Ninth Grade

Please visit www.air.org/CreditRecovery to access all of the research briefs and for more information about the *Back on Track Study.*

The Back on Track Study was supported by Grant R305A110149 from the Institute of Education Sciences, U.S. Department of Education to American Institutes for Research. The opinions expressed are those of the authors and do not represent the views of the Institute or the U.S. Department of Education.

Failing core academic courses during the first year of high school is a strong signal of trouble to come; course failures during ninth grade are associated with notable declines in 4-year graduation rates.[i] To get back on track, students who fail classes need opportunities to recover credit. Historically, students retook required classes in summer school or during the school year in a face-to-face setting. Online learning has emerged as a popular strategy for credit recovery. Providing credit recovery opportunities is now one of the most common purposes for offering online courses in K–12 educational settings.[ii,iii] Offering online credit recovery can provide flexibility for schools and students. Online courses are promoted as more engaging and interactive than face-to-face classes and providing individualized feedback and pacing. However, evidence about the efficacy of online credit recovery, in both the short and the long term, is lacking.

This brief summarizes findings from an experimental study that tested the impact of online Algebra I for credit recovery against the standard face-to-face version of the course. Participants were students in Chicago Public Schools (CPS) who failed the course during their first year of high school. The study was designed to provide information for districts around the country faced with decisions about offering credit recovery course options.[1]

The study focused on Algebra I because in many districts, more students fail Algebra I than any other course,[iv,v] and students who fail Algebra I in particular are unlikely to graduate. For example, at the time of the study, approximately one-third of ninth graders in CPS failed one or both semesters of Algebra I. Only 15% of students who failed both semesters of Algebra I in ninth grade during the 2005–06 school year graduated in 4 years. It is, therefore, of utmost policy importance to examine the efficacy of different strategies that may help struggling students get back on track.

The first research brief in this series described the study findings comparing online and face-to-face students on their educational outcomes at the end of the credit recovery course and at the end of their second year of high school. See Box 1 for a summary of those findings. Findings through the second year of high school were also the focus of an article published in the *Journal of Research on Educational Effectiveness*.[vi]

The early findings suggest an advantage of face-to-face courses in the short term, but differences might dissipate over time. Given the extensive use of online courses and the staffing flexibility they can provide, school administrators might feel a need to use online courses, but worry about long-term negative consequences.

BOX 1: *Summary of Back on Track Study Key* Findings for Outcomes Through the Second Year of High School (See Brief 1)

- The majority of students in the study successfully recovered credit in both types of courses, but students in the online course were less likely to pass than students in the face-to-face course (66% vs 76%).
- At the end of the course, students in the online course reported that their class was more difficult and less clear regarding grading expectations than students in the face-to-face credit recovery course. Students in the online course also had lower liking of and confidence in math, as well as lower algebra test scores, than students in the face-to-face course.
- There were no significant differences between online and face-to-face students in pass rates in subsequent math classes or their likelihood of being on track for graduation at the end of the second year of high school.

[1] The study was funded with research grant R305A110149 from the U.S. Department of Education's Institute of Education Sciences. The opinions expressed are those of the authors and do not represent the views of the Institute or the U.S. Department of Education.

This brief describes the study findings for students' math course accumulation and high school graduation by the end of their fourth year of high school (see Box 2). Specifically, this brief addresses the following question:

- Compared to retaking Algebra I as a standard face-to-face summer course, what is the impact of taking online Algebra I for credit recovery on:
  1. students' accumulation of math course credits through 4 years of high school, and
  2. probability of graduating from high school within 4 years?

BOX 2: *Summary Of Back On Track Study* Key Findings For Outcomes Through The Fourth Year Of High School

- Math credit accumulation was not significantly different for students in the online and face-to-face credit recovery courses. By the end of their fourth year, students in the online course and the face-to-face course were approximately one to two semester credits short, on average, of the six math semesters required for graduation: 4.6 credits for the online group and 4.7 credits for the face-to-face group.
- Graduation rates were not significantly different for students in the online and face-to-face credit recovery courses. Just under half of students (47%) in the online course and the face-to-face course graduated from high school within 4 years.

About the Study

Typically, CPS students who fail one or both semesters of Algebra I enroll in the next mathematics course in the sequence (Geometry or Algebra II) in their second year of high school, but to earn a diploma they must eventually recover the Algebra I credit during high school. One option is for students to attend summer school. However, the rate of recovery the summer after failing the course typically is low. For example, during the year before the study started (2009–10), only 13% of CPS freshmen who failed their spring semester of Algebra I recovered the course credit over the summer. This study was conducted in partnership with the district to investigate whether offering online credit recovery was more effective at promoting credit recovery than traditional face-to-face summer classes, the summer after failing Algebra I in Grade 9.

Random Assignment

This study used a lottery to determine students' course assignments: All students had a 50/50 chance of taking the course online or face-to-face. This ensures that the groups of students are statistically comparable.

In this study, first-year high school students who failed second-semester Algebra I were encouraged to enroll in summer school.[2] Students who enrolled were randomly assigned to either an online course or a face-to-face course. The first research brief in this series provides a description of the two credit recovery courses. By using random assignment and an experimental study design, this study provides a rigorous test of whether taking an online course resulted in better educational outcomes than taking a face-to-face course.

[2] The study focused on second-semester Algebra I because failure rates historically are higher than for the first semester.

The study took place in 17 CPS high schools that had large numbers of students who failed Algebra I relative to other schools in the district and that agreed to participate. The schools participated in the study in summer 2011, summer 2012, or both summers.

A total of 1,224 first-time freshmen participated in the study by enrolling in Algebra IB for credit recovery in summer 2011 or 2012. In total, 613 students were randomly assigned to take the online course, and 611 were assigned to take the face-to-face class.

There were no differences in class sizes, student characteristics, or prior achievement levels for students in the online and face-to-face classes.

Study Students

- Female: 38%
- Hispanic: 57%
- African American: 33%
- White: 8%
- Eligible for national school lunch program: 86%
- Eligible for special education services: 12%
- Spoke Spanish as their home or native language: 47%
- Failed first-semester Algebra I: 50%
- Failed second-semester Algebra I: 100%
- Average number of semester-long courses failed in the first year of high school: 4.5
  - More than two full-year courses failed, on average

The results presented in this brief draw on CPS student administrative records for the participating students. Earned math course credits were defined as the cumulative number of semester-long math courses that a student passed from the beginning of high school through the student's fourth year of high school, including credits earned during the summer. Because students who transferred to a charter school or out of the district during high school had incomplete course records in the district data, we analyzed math course credits only for 855 of the 1,224 students in the study who were enrolled in a CPS school for all 4 years or who were no longer enrolled in a school (69% of treatment group students and 70% of control group students).

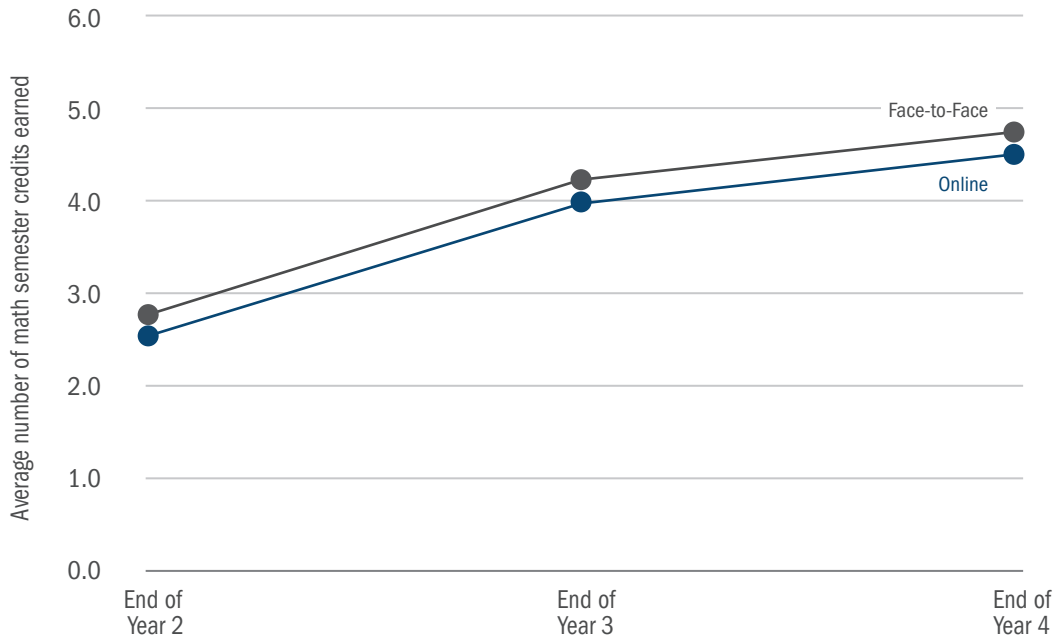
On-time high school graduation was defined using the district's graduation exit code at the end of the student's fourth year of high school (including the summer following the fourth year). Students who were still enrolled in the district after 4 years or who dropped out of high school were coded as a "nongraduate." Graduation status was considered unknown/missing for students whose last known status was *transferred to a school outside the district,* and these students were excluded from our analysis of on-time graduation. A total of 963 of the 1,224 students in the study were included in our analysis of on-time graduation (77% of treatment group students and 80% of control group students).

Study Findings

Students in online and face-to-face algebra credit recovery did not have significantly different total math credits, 3 years later

To graduate from high school, CPS students need to pass six semesters of math (three year-long math courses). Even though we found earlier that a larger percentage of students in face-to-face credit recovery successfully recovered credit for Algebra I than students in online credit recovery (76% versus 66%), students who took the online and face-to-face course accumulated a similar number of math credits in their second, third, and fourth year of high school (see Figure 1). By the end of his or her fourth year, the average student in the online and face-to-face groups was still approximately one to two semesters short of six semester math credits: 4.6 credits for the online group and 4.7 credits for the face-to-face group. In addition, just over half of the students in both the online and face-to-face group passed both semesters of the district's trigonometry/Algebra II course within 4 years (55% versus 58%).[3]

Figure 1. Math Course Credits Earned Through 4 Years of High School, by Type of Credit Recovery Course



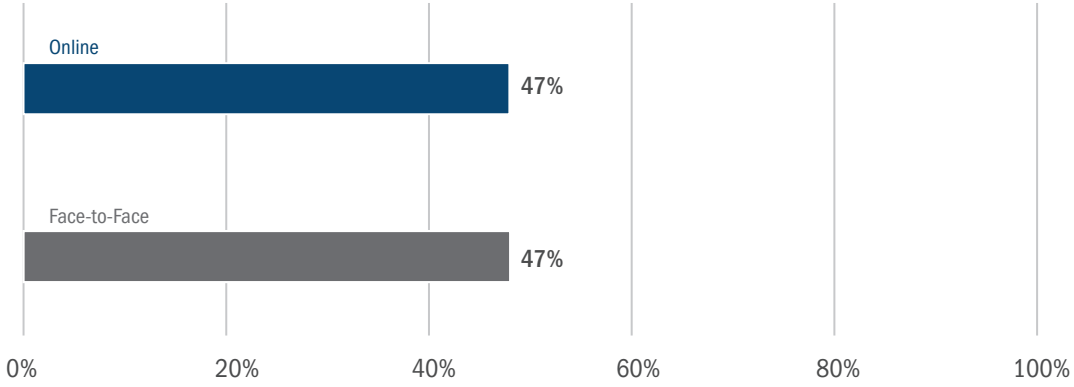
Note. Averages reported for students in the online course are observed averages. Averages reported for students in the face-to-face course are model adjusted, calculated by subtracting the effect estimate from the observed online group average. None of the online versus face-to-face differences are statistically significant at the .05 level, two-tailed test. The analysis was based on 425 online students and 430 face-to-face students, including students who graduated from high school, dropped out of high school, or were still enrolled in high school after 4 years.

[3] We also examined whether online credit recovery had an effect on students' ACT scores (which CPS students were expected to take in grade 11). Among the 59% of online and face-to-face students who took the ACT, there was no statistically significant difference between each group's average ACT composite score or math score.

Graduation rates were not significantly different for students in the online and face-to-face credit recovery courses

The ultimate goal of credit recovery is to help students earn the course credits needed to receive a high school diploma. However, the difference in credit recovery rates the summer after ninth grade between online and face-to-face courses did not translate into a difference in on-time graduation rates (see Figure 2). In both groups, just under half (47%) of the students graduated from high school within 4 years.

Figure 2. On-Time High School Graduation Rate, by Type of Credit Recovery Course



Note. The percentage reported for students in the online course is the observed percentage. The percentage reported for students in the face-to-face course is model adjusted, calculated by subtracting the effect estimate from the observed online group mean. The online versus face-to-face difference is not statistically significant at the .05 level, two-tailed test. The analysis was based on 473 online students and 490 face-to-face students.

Summary of Study Findings and Their Implications for Education Practice

The study findings show that there were no differences between online and face-to-face Algebra I credit recovery in end-of-high school outcomes. Although the first research brief in this series indicated that students may benefit more from a face-to-face course than an online course in the short term, the longer term results presented in this brief indicate that students are no more or less likely to accumulate math course credits over time or graduate if they take an online Algebra I credit recovery course instead of a face-to-face course.

This suggests that the initial negative effects of online relative to face-to-face credit recovery in Algebra I may dissipate, which some may interpret to mean using online courses for credit recovery is an acceptable, viable option for expanding access to credit recovery. With little rigorous evidence favoring one credit recovery option over the other, however, it is important to consider the factors that might influence the relative benefits and costs of online credit recovery.

For the study, implementation of the online credit recovery course followed practices commonly recommended by online providers at the time. Two critical practices pertaining to costs were that students take the online course in a standard school classroom setting, and that each class have an in-class mentor in addition to the online teacher. The use of school-based facilities, an in-class mentor, an online teacher, and the cost of the course software meant that the per-pupil costs were higher for the online credit recovery course than for the face-to-face course. Future implementations of online credit recovery could seek to limit these constraints in ways that reduce school-based facility costs, reduce salary costs, or provide greater economies of scale. If online credit recovery courses are less expensive to implement than face-to-face courses and provide students with equivalent educational outcomes, then efforts to promote online credit recovery may be warranted. Without a better understanding of how the costs and benefits of online credit recovery are likely to manifest under specific implementations and conditions, it is difficult to justify the rapid adoption of online credit recovery.

Even if improved implementation of online credit recovery increases its relative benefits and costs, it may be unrealistic to expect a single credit recovery course, whether online or face-to-face, to put failing students back on the path to on-time graduation. As described in the third research brief in this series, students in our study represented an extremely at-risk population, with low achievement, multiple course failures, and high absenteeism. For these students, navigating course and graduation requirements is an uphill battle that likely requires targeting multiple aspects of school disengagement besides specific math credits or subject knowledge.

Given these challenges, efforts to improve the utility of online credit recovery should focus on ways to better target online credit recovery to the students most likely to benefit from such a course, and ways to incorporate online credit recovery into a comprehensive intervention strategy for school engagement and dropout prevention.

Endnotes

i. Allensworth, E., & Easton, J. Q. (2007). *What matters for staying on-track and graduating in Chicago Public High Schools: A close look at course grades, failures and attendance in the freshman year.* Chicago, IL: Consortium on Chicago School Research.

ii. Clements, M., Stafford, E., Pazzaglia, A. M., & Jacobs, P. (2015). *Online course use in Iowa and Wisconsin public high schools: The results of two statewide surveys* (REL 2015–065). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Midwest. Retrieved from https://ies.ed.gov/ncee/edlabs/regions/midwest/pdf/REL_2015065.pdf

iii. Queen, B., & Lewis, L. (2011). *Distance education for public elementary and secondary school students: 2009–10* (NCES 2012-008). Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubs2012/2012008.pdf

iv. Ham, S., & Walker, E. (1999). *Getting to the right algebra: The Equity 2000 initiative in Milwaukee Public Schools.* New York, NY: MDRC. Retrieved from http://www.mdrc.org/publications/98/workpaper.html

v. Helfand, D. (2006, January 30). A formula for failure in L.A. schools. *Los Angeles Times.* Retrieved from http://www.latimes.com/local/la-me-dropout30jan30-story.html

vi. Heppen, J. B., Sorensen, N., Allensworth, E., Walters, K., Rickles, J., Taylor, S. S., & Michelman, V. (2017). The struggle to pass algebra: Online vs. face-to-face credit recovery for at-risk urban students. *Journal of Research on Educational Effectiveness, 10*(2), 272–296.

AIR®
American Institutes for Research®

1000 Thomas Jefferson Street NW
Washington, DC 20007-3835
202.403.5000

www.air.org

UCHICAGO Consortium on School Research

1313 East 60th Street
Chicago, Illinois 60637
773.702.3364

consortium.uchicago.edu

0542-5_06/17