Paper 3: Content and Rigor of Algebra Credit Recovery Courses

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Purpose / Objective / Research Question / Focus of Study[3]:
This paper describes the content, organization and rigor of the f2f and online summer algebra courses that were delivered in summers 2011 and 2012. Examining the content of both types of courses is important because research suggests that algebra courses with certain features may be better than others in promoting success for struggling students. One key finding from the literature is that algebra students should have ongoing opportunities to develop procedural fluency and conceptual understanding and engage in meaningful problem solving opportunities, rather than focusing exclusively on skill development and symbolic manipulation (National Governors Association Center for Best Practices [NGACBP] & Council of Chief State School Officers [CCSSO], 2010; National Mathematics Advisory Panel, 2008; National Council of Teachers of Mathematics, 1989, 2000, 2006; National Research Council, 2001). Another reason it is important to examine the content of summer credit recovery courses, in particular, is due to the perception that these courses may get "watered down," rewarding students who show up for summer school but who may not have mastered the material. For example, Baltimore City Schools recently revamped its summer school program after discovering that attendance accounted for 80% of students' grades (Green, 2010). Other large, urban districts, such as Philadelphia and Detroit, have implemented similar initiatives to overhaul traditional summer course offerings for at-risk students (National Summer Learning Association, 2010).

More specifically, the paper will address the following research questions:

1) How did the online and f2f Algebra IB courses compare in terms of the difficulty of the content? (*e.g. what proportion of time in each type of course was devoted to second semester algebra, first semester algebra and pre-algebra topics?)*

2) How did the online and f2f Algebra IB courses compare in terms of the nature of the content? (*e.g. developing procedural skills, conceptual understanding and problem solving)*

3) How did the online and f2f Algebra IB courses compare in terms of the coherence and sequencing of topics?

4) How did the online and f2f Algebra IB courses compare in terms of grading expectations? *[What proportion of online and f2f students' grades were based on assessments (quizzes, tests) and other criteria (effort, participation, behavior, etc.)]?*

Data Collection and Analysis:
We will draw from several different sources of data that were collected in both conditions in both summers to answer the paper's research questions. These include archival data generated from

[3] Any parts of the abstract template that do not appear in this paper appear in Paper 1, which describes the overall study design.

the online course, course materials (syllabi, annotated tables of contents), and teacher surveys. Each of these is described more fully below:

1) **Aventa/K12 online course data**. The Aventa archival course data include the amount of time students spent in the course and the algebra topics covered and mastered. The study team also has access to all of the learning activities in the course, which will be reviewed to describe the nature of the learning activities.
2) **Course materials**. The f2f teachers provided syllabi, annotated tables of contents and sample lesson materials (problem sets, worksheets, tasks, etc.). From these materials we are able to assess the algebra topics covered, amount of time spent on each topic, and organization of topics for each f2f class offered as part of the study.
3) **Surveys**. All teachers and students completed surveys at the end of each session. Surveys of teachers in the online and f2f courses included the criteria they used to determine grades in the credit recovery courses.

We will generate descriptive statistics from all of these sources to compare the difficulty, coherence and nature of the f2f and online courses. All of these data will be used to describe the overall level of rigor of both types of courses.

Findings / Results:
The initial results suggest that the online course (in both summers), in comparison to the f2f courses, was more rigorous in terms of the algebra content that students were expected to learn, more coherent in terms of how topics were sequenced, and more demanding in terms of the criteria used to calculate grades. More specifically, the online course content was considered typical of second semester algebra and included a fixed set of topics that were organized sequentially within and across 5 units. Conversely, the topics and sequencing of the f2f courses varied widely among the f2f teachers, who had discretion in creating the syllabi and assembling learning activities for these courses. The f2f topics included not only second semester algebra content, but also first-semester algebra and pre-algebra content, and topics did not typically follow the sequential structure of the online course. Though the content of the online course was more aligned than the f2f course with the actual course it was supposed to be, these findings suggest that the online course may have been too difficult for students. In the online course, students did not have the ability to revisit pre-requisite skills and concepts. In contrast, f2f teachers had the flexibility to tailor the content to the skill levels and perceived needs of their students.

Conclusions:
Information from this paper will be used to help frame the short- and long-term study results presented in Papers 1 and 2, which compare outcomes for students who took the online and f2f credit recovery courses. The paper will also contribute to the relatively thin research base on what it means for students to be proficient in algebra. Although the content of first and second semester algebra is fairly uniform and well specified, the proportion of topics that students should master is not. This issue is increasingly salient in light of the Common Core State Standards for Mathematics (CCSSM), which place a stronger emphasis on conceptual understanding and problem solving than more traditional algebra courses and are considered more rigorous. Implications for helping at-risk students, who were the focus of this study,

succeed in more demanding CCSSM algebra courses and associated assessments will be discussed.