

Abstract Title Page
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Title:

Proficiency-Based Pathways in Three Pilot Programs: Examining Implementation and Outcomes

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Abstract Body

Limit 4 pages single-spaced.

Background / Context:

Description of prior research and its intellectual context.

Proficiency-based or competency-based approaches to education are undergoing a resurgence in both K-12 and higher education settings, spurred in part by advances in digital learning technologies (Priest, Rudenstine, Weisstein, & Gerwin, 2012; Soares, 2012). These approaches allow students to progress at their own pace through a diverse range of personalized learning experiences aligned to students' interests. In a proficiency-based system, students receive credit not as a function of how much time they spend studying a subject but, rather, based on demonstrations and assessments of their learning. In addition, they are not constrained to progress at the same rate as their peers. The approach allows for accelerated learning among students who master the material quickly, and it provides additional time and—ideally, additional support—for students who need them. The theory is that a larger share of students will ultimately reach proficiency in a given content area if they are given the freedom to advance at their own pace and if their learning experiences are tailored to their needs and interests (Lewis et al., 2013; Priest, et al., 2012; Sturgis & Patrick, 2010). Moreover, policymakers have been responsive to the growing proficiency-based education movement. As of March 2012, 36 states had authorized waiver mechanisms or other alternative to their seat-time requirements for high school graduation, and New Hampshire has maintained a competency-based credit system since 2009 (Cavanagh, 2012; Grossman & Shipton, 2012; New Hampshire Department of Education, 2012). Despite considerable momentum in the field, proficiency-based systems are not well-researched. Existing studies have focused largely on narrative descriptions of promising models and on interviews with students and practitioners in schools that have adapted proficiency-based approaches (Priest, et al., 2012; Sturgis & Patrick, 2010).

The current study focuses on three distinct approaches to proficiency-based education. It attempts to extend the research base by describing the implementation of three diverse technology-enabled models and by providing evidence about students' experiences and learning outcomes under each model.

Purpose / Objective / Research Question / Focus of Study:

Description of the focus of the research.

During the 2011-12 and 2012-13 academic years, the Bill & Melinda Gates Foundation funded three organizations in enhancing and refining the use of proficiency-based educational models at the high school level. The organizations—which included two large school districts and one intermediary organization—carried out the pilot programs in a total of 11 high schools distributed across 5 districts. The interventions differed across sites and schools but had in common the use of online technology to allow students to progress toward mastery along defined pathways, to receive credit for demonstrated mastery, and to have access to rich online learning experiences accessible anytime/anywhere. The interventions also shared a focus on improved data management through development of online systems that would help teachers award credit for mastery.

Our evaluation of this set of pilot interventions set out to address three core questions about the interventions:

- 1) To what extent did the proficiency-based interventions comport with the design principles of proficiency-based pathways as described in the grant program (pathways to mastery, credit for mastery, and anytime/anywhere learning)?
- 2) Among students exposed to the pilot interventions, how did their self-reported learning experiences vary within and across programs?
- 3) To what extent did students' exposure to proficiency-based pathways models predict their academic performance in the targeted content area of mathematics or reading, as measured by performance on state accountability tests?

Setting:

Description of the research location.

The study examines proficiency-based pathways implementation in five settings, each of which is summarized, alongside descriptions of the interventions and populations, in Table 1 (see Appendix B). Setting A is a suburban district of roughly 10,500 students, about 72% of which are Hispanic or Latino, 19% of which are white, 5% are Asian, 2% are African American or American Indian, and a majority of which are eligible for free or reduced-price lunch. Setting B is an intermediary organization working with three magnet schools in two large urban districts and a proficiency-oriented high school in one small town community. The schools' percentage of minority students in Site B ranges from 5% to 93%, with free/reduced lunch eligibility ranging from 35% to 65%. Site C is a large urban district serving more than 140,000 students, of which about 56% are African American, 18% are Hispanic or Latino, 14% are white, 7% are Asian, and less than one percent are American Indian. A majority of students in Site C are eligible for free or reduced-price lunch.

Population / Participants / Subjects:

Description of the participants in the study: who, how many, key features, or characteristics.

As shown in Table 1, the students exposed to the pilot intervention in Site A include about 651 students studying mathematics at the eighth or ninth grade level, just under a quarter of which are in one middle school, and the remainder of which are in one high school. The students are concentrated in targeted classrooms that chose to take part in the pilot. Their demographic attributes reflect the district as a whole. Pilot students in Site B include about 2,369 students in grades 9 through 12, disbursed among four high schools, with demographics as described above. The pilot interventions in these sites generally applied to all of the social studies and ELA classes in the participating schools. Pilot students in Site C include about 528 ninth grade students studying English language arts; their demographics reflect the district as a whole. They are disbursed among 6 high schools and concentrated within the particular classrooms of 7 teachers who chose to participate in the pilot.

Intervention / Program / Practice:

Description of the intervention, program, or practice, including details of administration and duration.

The interventions, which vary by site, are summarized in Table 1. In Site A, the intervention focuses mainly on the development and roll-out of four online mathematics games and of teacher-developed instructional videos that they can use to "flip" their classrooms so that students can watch lectures outside of class and received personalized instruction during class. In Site B, the intervention focuses on portfolio-based demonstrations of proficiency and rubric-based grading for clear and frequent feedback. In Site C, the intervention is a set of five technology-enhanced, project-and-rubric-based ninth-grade language arts units that encourage proficiency-based teaching and learning. Moreover, in all sites, the intervention includes build-

out and refinement of a digitally supportive and interoperable learning management system that allows teachers and parents to track students' learning progressions. However, these improved learning management systems were not rolled out to all sites during the pilot years.

Research Design:

Description of the research design.

To obtain a quasi-experimental estimate of the pilot interventions' effects on student performance in the targeted subject areas, we adopt a distinct approach for each site to reflect the differing scope of implementation across sites. In all cases, we use what amounts to an interrupted time-series design with a matched comparison group, but the level of analysis differs across sites, as does the construction of the comparison group. In Site A, we are concerned that the four mathematics games and flipped classroom videos that were developed as a central part of the intervention have too low of a dosage to yield a detectable effect on students' performance in mathematics. Instead, we believe that the most useful analysis for the field of proficiency-based learning is one that estimates the holistic effect of the site's proficiency-based reform on student achievement across the district. In 2008-09, the district adopted a "competency-based" model of teaching and learning for the entire district, so we propose to compare pre/post grade-level trends on the state accountability test between the site and a matched sample of comparison schools in the state. We will focus primarily on mathematics to reflect the content-area emphasis of the pilot work, however.

In Site B, the portfolio and rubric-based interventions are carried out largely at the school level, so we will draw matched within-district comparisons for each school, with the exception of the school in the one-high-school district, for which we will draw matches from a statewide pool.

In Site C, because the intervention occurs at the classroom level within comprehensive high schools, we will use a student-level analysis that compares students in pilot classrooms to observably similar students in non-pilot classrooms in the same school, subject (English language arts), grade, and year. Additional analytic details are described in the next section.

Data Collection and Analysis:

Description of the methods for collecting and analyzing data.

To address research question 1, our data collection has included site visits to the program schools at the end of pilot Year 1 (June 2012) and during the fall and spring terms of Year 2 (November 2012 and May 2013, respectively). Data collection at each visit included interviews with central administrative staff and pilot teachers, as well as observations of pilot classrooms.

To address research question 2, in May 2013, we collected a survey data from all the pilot school students about their implementation of the intervention, and we will soon examine variation in students' reported experiences at the classroom, teacher, school, and project-site levels. These data will allow us to characterize variation in each site's programmatic approach and to examine the extent to which programmatic design corresponds to student self-reports.

To address research question 3, we use a distinct approach for each site, as described in the previous section. In Site A, we are collecting public, school-level performance data in mathematics from districts across the state and using propensity scores to match each grade-by-year average in the treatment schools to a set of schools matched on student achievement and demographics during the period before district-wide competency-based reform took effect in 2008-09 (Abadie, Drukker, Herr, & Imbens, 2004; Rosenbaum & Rubin, 1983; Rubin, 1997). In Site B, we are adopting a similar approach, but as noted above, we are limiting the comparisons to within-district schools for the 3 schools located in a large urban district, and using a within-

state comparison pool for the school that is the only high school in its district. We will undertake the analyses at the grade-by-school-by-year level, though not all high school grades are subject to accountability testing, thereby constraining the sensitivity of the analysis to changes in non-tested grades.

For two of the Site B schools, the comparisons will be based on demographic and achievement data from the years before the schools began working with the intermediary organization that is driving the proficiency-based reform. For the other two Site B schools, which are new schools, the comparisons will be based on demographically similar schools but will not be able to incorporate pre-intervention performance data. Our analysis will use robust standard errors that reflect the nesting of year-by-grade observations within schools.

A limitation of the aggregated-data approach proposed in Sites A and B is that changes in student composition may confound the treatment effect estimates, but we will examine the magnitude of such changes to assess the extent of likely bias.

In Site C, the comparison will be undertaken at the student level, using students from the same schools, grades, and years who were not exposed to the treatment materials. One unavoidable limitation of this approach is that in many cases, the teachers of the comparison group will differ from the treatment-classroom teachers, limiting our ability to differentiate teacher and curriculum effects. Also, because the intervention was delivered in ninth grade, which is not part of the state accountability testing system, our analysis there will not be able to examine state accountability test scores. The analysis will adjust for demographic attributes and for at least one baseline score using student-level benchmark assessment data from the district.

Findings / Results:

Description of the main findings with specific details.

Regarding research question 1, which focuses on design and implementation principles, we find that the programs have approached proficiency-based education quite differently, likely as a function of their contexts, but that a common thread is the necessity of a strong data management system that allows teachers to track student proficiency over time.

Regarding research questions 2 and 3, student survey and outcome data are currently being collected. By September of 2013, we will be able to report in Site A on the estimated effects of a district competency-based reform on students' aggregate performance relative to students in a similar set of districts in the same state, matched as a function of demographics and prior test score performance. In Site B, we will be able to report on school-level trends relative to a matched set of comparison schools from the same district or (in one case) the same state. The Site A and B analyses will reflect implementation only through Year 1 of the pilot (2011-12) and not yet through the second and final year (2012-13). In Site C, we will be able to compare student-level performance on benchmark tests and student attendance at the end of pilot Year 2.

Conclusions:

Description of conclusions, recommendations, and limitations based on findings.

This study highlights the role of instructional technology in facilitating proficiency-based educational approaches—both the ways in which technology is transformative and the ways in which it may be useful but less essential. It also lays bare some of the challenges in bringing proficiency-based models to scale. Though our analyses of students' outcomes are still under way, the quasi-experimental analytic results will provide new evidence on the near-term effects of proficiency-based approaches and pave the way for studies designed to yield more-robust causal inferences.

Appendices

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Appendix A. References

References are to be in APA version 6 format.

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Appendix B. Tables and Figures

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Table 1. Summary of Sites, Interventions, Populations, and Analytic Comparison Groups

Program	Setting	Pilot scope	Share of minority students	Targeted grades and content areas	Key intervention attributes	Comparison data
A	Suburban school district	1 high school and 1 middle school; about 651 students (10,500 students in district-level reform)	81%	Grades 8-9 mathematics	Online math games and "flipped" classroom instruction in the context of a competency-based system district wide	Matched school-by-grade-level test score performance within state and year
B	Intermediary organization	4 high schools in 3 districts; about 2369 students	71%	Grade 9-12 social studies & language arts	Portfolio assessments with rubric-based evaluation	Matched school-by-grade test score performance within district or state, and year
C	Large, urban district	7 high schools; about 528 students	86%	Grade 9 language arts	Project-based learning units with rubric-based evaluation	Matched student-level benchmark data and attendance within school, grade, and year