Abstract Title: The Use of New York State Regents Exams to Guide MSPinNYC Decision-Making to Build an Effective Model of the Urban STEM Classrooms

MSP Project Name: Math and Science Partnership in New York City (MSPinNYC)

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120 word summary:

High stakes, end-of-course Regents exams are used to guide the development and implementation of a new model for the urban science and mathematics classroom: the Peer Enabled Restructured Classroom (PERC). PERC is a collaborative, peer-led pedagogy that is implemented daily in the classroom and thus restructures teaching and learning. We demonstrate the use of Regents data to steer the project including: as an outcome variable for a pseudo-field trial, to create "non-negotiable" features of the model, and to define one of the most significant aspects of the model – the selection and training of the peer leaders.

Section 1**. Question for dialogue at Learning Network Conference session.**

Can student performance data, even high stakes data, be used effectively to change practice and guide policy?

Section 2. **Conceptual framework.**

The MSPinNYC has routinely used a mixture of qualitative and quantitative data to steer the project. In this talk, however, we will focus on our use of end-of-course, high stakes exams, namely the New York State Regents exams. These exams are required for graduation, used by policy makers to make dramatic (and sometimes draconian) changes in schools (changing Principals, closing schools), are indicative of a persistent Achievement Gap in high school graduation, are required of all students for graduation, and are, simultaneously, a very low standard for student achievement. This latter statement is critical because student failure on required Regents exams can be (and should be) interpreted as a crisis in American education. Why is it that only 50% of 9th graders in high poverty, high minority districts can pass the Integrated Algebra exam, which requires fewer than 40% of the questions answered correctly? Is algebra incomprehensible? Should an algebra graduation requirement be replaced by another mathematics subdiscipline such as statistics? Can the classroom be changed substantially to enhance student learning and, as a consequence, increase performance on the Regents exams?

In Year 4 of the Project, MSPinNYC began to develop a new model for the urban classroom to enhance learning and to concomitantly increase performance on the Regents exams. The Peer Enabled Restructured Classroom (PERC) is a student-centered classroom in 9th and 10th grade required mathematics (Integrated Algebra) and science (Living Environment) that harnesses the power of collaborative learning to create student leaders, improve student performance, and engage students deeply in mathematics and science learning in the classroom. The PERC classroom is structured around collaborative learning groups of four to five students engaged in activities designed by the teacher. Each group is led by a high school peer (a "Teaching Assistant Scholar", or TA Scholar) who completed the course and associated Regents exam and is trained in content and pedagogy. The classroom teacher begins each class with about 10 minutes of direct, whole-class instruction. Students then begin working in groups on the day's activity or exercise. The teacher rotates throughout the classroom assessing student learning in the groups, overseeing the performance of the peer leaders, and occasionally addressing the whole class as the need arises. The teacher is an expert in student-centered instruction and uses the model daily.

The Peer Enabled Restructured Classroom (PERC) builds upon the well-documented success of collaborative learning strategies in general and peer-facilitated learning strategies in particular (Topping and Ehly 1998). The most common peer tutoring models are supplemental to the classroom. For example, many schools routinely offer after-school or lunch-time peer tutoring sessions. In colleges, Peer Led Team Learning (PLTL) has been successful in improving student success in the sciences by incorporating peer-led workshop sessions into the lecture hall (Gafney and Varma-Nelson, 2007; Gosser, et al, 2010). Inclusion of peer-led workshops or problem-solving sessions has been shown to improve student success in these classrooms. However, in all of these examples, peer tutoring does not redesign the roles of the teachers or students nor does it redesign how learning occurs in the classroom. Yet, regardless of the specific implementation, all peer tutoring implementations have a demonstrated impact on the peer tutors themselves and often on the student tutees (Greenwood and Delquadri, 1989; Karcher, 2009; Maheady and Mallette, 2006; Robinson, et al, 2005). In fact, peer tutoring appears to be a robust mechanism to improve student learning but has rarely been used to dramatically change classroom practice.

The barriers to implementing a peer-facilitated, collaborative pedagogy daily in the high schools are large and include: identifying peer leaders, training peer leaders, developing teachers to teach with peer leaders, and often reprogramming classes to accommodate the peer model. Such significant change in daily instruction could not occur without substantially improving Regents passing rates.

As baseline data, Tables 1 and 2 demonstrate the challenge to MSPinNYC. The Achievement Gap is clearly evident in Table 1 where graduation rate differences are significant. In Table 2, Regents passing rates in lower income districts, such as Brooklyn, are low, are consistent with low graduation rates in the same districts, and are borne mainly by Black and Hispanic students. Regents passing rates must improve to begin to close the high school graduation Achievement Gap.

Table 1 – Evidence of Achievement Gap in NYC –
2009 Graduation Data by Percent of Subgroup

Asian	Black	Hispanic	White	ELLs
80.1%	57.8%	55.9%	76.5%	44.4%

Table 2 – High School Student Achievement on Regents Exams in NYC– 2009 Data

High School District	**Passing Rate Percentage**		
	9th gr algebra	**9th gr biology**	**10th or 11th gr chemistry**
Brooklyn district	51	64	40
Queens district	59	70	50
Bronx district	48	57	38
Manhattan district	62	71	61
Staten Island district	64	67	56

Regents passing rates are one measure of success that can be obtained from Regents data. In addition to the passing rates, specific scores on the exams are predictors for success in more advanced courses as well as requirements for admission to college. For example, the City University of New York still guarantees a spot for all NYC graduates. However, many of the senior colleges require students to earn a score of 75 or better on Regents exams to be considered for admission. (A score of 65 is considered "passing"). A score of 85 or better is deemed "mastery" and is required to earn a "Regents Diploma with Advanced Designation." In elite high schools in New York, virtually all graduates earn an Advanced Regents Diploma. An Advanced Regents diploma serves as a rough (and minimal) measure of college preparedness.

Regents Data Informing the Project – In this talk we discuss how Regents data have been used to guide the project and how they could be used in the future. In particular, we focus on how these data have 1) served as the primary outcome in a quasi-experiment field trial tests of the PERC model, 2) been used as an *input* to establish expectations and provide structure to the TAS class, 3) been used to establish one non-negotiable, and 4) could serve as an interim proxy for college preparedness.

Section 3. **Explanatory Framework.**

PERC Field Trials

Trial Setup -- During the past two years, the PERC model was systematically studied in five schools with 16 teachers in two subject areas: Integrated Algebra (IA—a one year, 9th grade mathematics course required for graduation) and Living Environment (LE—a one year, 9th grade biology course effectively required for graduation). Whenever possible, comparison classes were created that were taught by the same teacher or another teacher during the same academic year and students were placed into the PERC or comparison classes randomly. PERC and non-PERC classes used the same curriculum during the year. The state-wide Regents exam was administered in June of each of the two academic years. Regents scores of students in each class were reported as were the Regents scores of students in the comparison classes.

Results – Table 3 shows the percentage of students passing the relevant Regents exam during the June administration. Each set of data for a particular school represents multiple classrooms and, in some cases, multiple teachers. For clarity, we chose to aggregate the data by school and category. In all cases, variability within the schools by teachers was smaller than variability between schools. For example, in the 2009-2010 school year, the two IA PERC teachers in one school had a 52% and a 53% passing rate. The non-PERC control teacher had a 39% passing rate.

Table 3 – Regents Passing Rates in MSPinNYC PERC and Comparison Classrooms 2008-2010

		Experimental Group		Comparison Group	
School	**Course**	**N**	**%65-100**	**N**	**%65-100**
Large HS Bronx	IA	89	64.0%	199	42.71%
Large HS Bronx	IA	82	67.1%	199	42.71%
Large HS Bronx	IA	116	53.00%	23	30.00%
Large HS Bronx	IA	93	52.00%	23	30.00%
Large HS Bronx – repeater	LE	50	56.00%	95	62.00%
Large HS Bronx - repeater	LE	84	62.00%	95	62.00%
Small HS Bronx	LE	30	96.7%	68	76.50%
Small HS Bronx -repeater	IA	43	51.2%	24	50.00%
Small HS Bronx -repeater	IA	36	55.5%	43	44.00%
Small ELL HS	LE	60	73.3%	44	29.00%
Small ELL HS	IA	18	88.9%	43	76.74%

Small ELL HS	IA	60	73.00%	44	29.00%
Large HS Manh 1	IA	58	46.6%	193	19.69%
Large HS Manh 1	IA	37	40.5%	193	19.69%
Large HS Manh 1	IA	66	30.3%	193	19.69%
Large HS Manh 1	LE	71	66.2%	212	49.05%
Large HS Manh 1	LE	40	77.5%	212	49.05%
Large HS Manh 2	LE	47	82.00%	185	88.00%
Large HS Manh 2	IA	45	82.00%	214	68.00%

Table 3 reveals that Regents passing rates increased in most PERC classes but not all. In classes in which students were taking the course (IA or LE) for the first time (46 classes), the student passing rates on the Regents exams in PERC classes exceeded passing rates in comparable, non-PERC classes by an average of **22** percentage points**.** These results appear to be robust and to be independent of discipline (IA or LE).

In repeater classes, however, PERC students did not outperform their comparison cohorts. Repeater classes are one semester Regents review courses taken by students who took the course the prior year but failed the Regents exam and/or the course.

Lastly, in one Manhattan school in LE PERC students did not outperform non-PERC cohort. A detailed analysis of student characteristics (IEP, ELL status, 8th grade level) revealed that a preponderance of lower performing students had been placed into the PERC class by the Assistant Principal. The AP believed that the PERC class would benefit the needier students more and thus did not randomly place students into PERC and non-PERC classes. When students from the comparison cohort were matched by academic characteristics, the PERC students outperformed the comparison group by 21%.

Regents Scores Used to Set Expectations and Structure TAS Class

The TA Scholars were drawn from the cohort of students who succeeded in the LE or IA courses but whose Regents scores were not high enough for entry into the CUNY four-year colleges (65-74; average 72). This cohort of students is likely to graduate high school and enter community college, but place into remedial mathematics courses (Michalowski, 2007). During the years of pilot trials, TA Scholars were encouraged to retake the Regents exams after their year in the PERC classroom. Scores improved on average by 8 points to over 80, a level acceptable for admission to a CUNY senior college (over 75).

Fidelity of Implementation and the Development of a Non-Negotiable—the TA Scholar Class

One variable in the implementation of PERC was the timing of the TA Scholar class. Some schools integrated the TA Scholar class into the curriculum, offered credit for the course, and had it taught by the PERC teacher. This required the schools to make substantial programming changes: the teachers taught, for example, four Integrated Algebra classes and one TA Scholar class instead of five Integrated Algebra courses; student schedules had to be adjusted so all TA Scholars could attend both the PERC class and the TA Scholar class; and a curriculum for the TA Scholar class had to be developed. Some schools, unwilling to make such a substantial commitment to the model, trained TA Scholars after school (a "club" model) or during first period – a typically non-academic period considered to be "before school", and others ran the TA Scholar class after school as a club or during first period. In the after school and first period implementations it was found that 1) TA Scholars often did not or could not attend the class, 2) teacher satisfaction with the TA Scholars was low, 3) Regents performance was variable, often successful, but not as successful as other implementations. (At one school, non-PERC

Regents passing rates were 20%, a first period TAS class implementation was 30%, and a school day implementation was 45%.) Similarly at another school using the after-school "club model", all clubs were cancelled after an altercation in the community. In addition, the "club model" produced a sustainability issue. If schools were unwilling to alter their programming day to accommodate the model, then they were unwilling to truly integrate the model into their school culture – despite improvements in Regents scores.

In the current implementation (adapted by four schools this year) the TA Scholar class has been integrated into the curriculum.

Going Forward

Students passing but scoring below 75 on the IA and LE Regents exams generally fail to complete subsequent Regents exams in more advanced topics (Algebra 2, Geometry, Chemistry). As the model matures, the TA Scholars have become a primary focus with the intention to adapt the model to more advanced STEM courses and examine the impact of being a TA Scholar on subsequent performance. We plan to use Regents scores, in part, to address the following questions: do TA Scholars succeed in Chemistry and Geometry at rates comparable to non-TA Scholars with similar Regents profiles; do TA Scholars earn Regents Diplomas with Advanced Designation at rates higher than non-TA Scholars; and ultimately, do TA Scholars require less mathematics remediation than comparable graduates.

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