

**INTER-OFFICE CORRESPONDENCE**  
**Los Angeles Unified School District**

**INFORMATIVE**

**TO:** Members, Board of Education Date: July 10, 2008

**FROM:** Randy Ross  
Director of Educational Policy

**SUBJECT:** **Algebra 1 – Getting Past the Gatekeeper**

**Copies:** D. Brewer, R. Cortines, J. Morris, J. Elliott, S. Weston, J. Ramos, J. Slayton, G. Daley, J. Rickles, E. Wong, J. Crain, M. Medina, J. Thornton

Noting that Algebra is a gatekeeper to academic and workplace success, Board Member Vladovic posed the following questions to the IAU regarding Algebra 1 in LAUSD.

- Have we ever done a comprehensive look on why so many of our students fail Algebra 1?
- Why do we promote students who fail Algebra 1A to 1B? I can't imagine they are successful in 1B?
- Is there a study that links grades in Algebra to grades in further math? What do the results show?
- In terms of the district math pacing plan, is it done in a logical manner? It diverts from the book drastically and seems to have instances of disjointed pockets of knowledge rather than a cohesive logical approach.
- Is there a best practices/model that works to increase passing rates in Algebra?

In posing these questions, Dr. Vladovic seeks to know what the District is doing well/not well, what we need to work on, and what innovative methods are available for promoting greater success in Algebra. These questions are timely given the State Board of Education's July 9 decision to mandate that all 8<sup>th</sup> graders in California's public schools take Algebra 1.

To pursue answers to these questions, we reviewed various documents (memos, informatives, Board Committee presentations, and evaluation reports) and sought input from District staff. Accordingly, we would like to thank District staff for contributing to this informative, especially Jeanne Ramos, Jordan Rickles, Julie Slayton, Shelley Weston, and Esther Wong.

***Question 1:** Have we ever done a comprehensive look on why so many of our students fail algebra 1?*

Since the inception of the District Secondary Mathematics Plan in 2001, the LAUSD Program Evaluation and Research Branch has annually evaluated the implementation of the plan. One key factor highlighted as contributing to high student failure was the quality of instruction in Algebra 1 classrooms. Most observed Algebra 1 classrooms exhibited low levels of discussion, feedback, and cognitive challenge. Few teachers taught for conceptual understanding. A second key explanatory factor is students' lack of preparation for Algebra 1 – only a third of 8th graders taking Algebra 1 scored Proficient+ on their 7th grade math CST.

***Question 2: Why do we promote students who fail Algebra 1A to 1B?***

According to LAUSD MEM-3410.0 (Algebra Readiness Course, November 27, 2006), “Students, 8<sup>th</sup> or 9<sup>th</sup> grade, who do not pass Algebra 1A in the fall semester/mester, should be provided with three options for the spring semester/mester: (1) repeat Algebra 1A; (2) continue in Algebra 1B; or (3) enroll in a one semester mathematics elective course, with a curricular focus aligned to the emphasis of the General Math CST....” Jordan Rickles found that among 1st year HS students (in 2005-06) taking Algebra 1, 61% repeated 1A and 54% repeated 1B (see Appendix).

Jeanne Ramos, Director of Secondary Mathematics, says that the placement of students who fail Algebra 1A is a judgment call. She notes that there are studies that have shown that if students fail Algebra or a portion of Algebra and must repeat it, the best preparation for future success in Algebra is having studied Algebra. In other words, even students who have failed the course have learned something on which to build. Returning to previous content could lower students' self confidence for learning mathematics.

It is also important to note that beginning 2002, all 8th graders were required to take a one-year course in Algebra. Implementation of the policy resulted in most 8<sup>th</sup> graders not passing the course. In response, beginning 2006-07 the District inserted an Algebra Readiness Course into the curriculum for 8<sup>th</sup> grades who were deemed not academically prepared to take Algebra. The implicit premise of this shift in policy was that requiring 8<sup>th</sup> graders to take Algebra in effect promoted many 7<sup>th</sup> graders who should not have been promoted based on their performance in math.<sup>1</sup>

Given this background, we propose that the District conduct a comprehensive analysis of the math pathways and performance of LAUSD's 7<sup>th</sup>, 8<sup>th</sup>, and 9<sup>th</sup> graders. One question to be answered by such an analysis is, Of students who enroll in Algebra 1B despite having not passed Algebra 1A, what percentage pass Algebra 1B relative to the pass rate for Algebra 1B students who passed Algebra 1A?

***Question 3: Is there a study that links grades in algebra to grades in further mathematics?***

Research links success in Algebra to high school graduation, college attendance, graduation from college, and employment and earnings. The national Mathematics

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<sup>1</sup>See LAUSD MEM-3410.0, Robert Collins, Algebra Readiness Course, November 27, 2006).

Advisory Panel's Final Report (March, 2008, p.xii) reported that "Algebra I is a demonstrable gateway to later achievement" and that "students who complete Algebra II are more than twice as likely to graduate from college compared to students with less mathematical preparation."

A more direct answer to this question could be obtained by using student-level LAUSD data to correlate course grades or CST results in Algebra 1 with grades in Geometry and/or Algebra 2.

***Question 4:*** *In terms of the district math pacing plan, is it done in a logical manner? It diverts from the book drastically and seems to have instances of disjointed pockets of knowledge rather than comprehensive logical approach?*

Jeanne Ramos notes that "the Secondary Mathematics Instructional Guide (MIG) for grades 6-12 is a concept-driven document, designed to guide instruction, not to be a pacing plan. In accordance with the California Mathematics Framework (2007), it promotes a balanced curriculum that focuses on conceptual understanding, computational and procedural skills, and problem solving. The MIG is organized logically around the big ideas and important concepts and skills addressed in the Mathematics Content Standards for each grade level, including Algebra I. The course content is divided into four instructional units including concept lessons that address important concepts and skills, and align to the Periodic Assessments. As a resource for instructional delivery, textbook connections are provided for each adopted textbook." LAUSD researcher Jordan Rickles notes that "about 75% of teachers in the fall survey for the A-G study said they found the instructional guide useful."

Given the evaluation findings discussed above that the quality of Algebra instruction in most observed classrooms is low, one has to wonder about the degree to which the instructional guide actually guides classroom instruction.

***Question 5:*** *Is there a best practice/model that works to increase passing rates in Algebra?*

In response to this question, Jeanne Ramos and Jordan Rickles cited several pertinent research findings regarding best practices:

- Providing students the opportunity to engage in solving rigorous mathematics tasks. Research findings have shown that the students who are exposed to rigorous mathematics instruction outperform students that are taught procedural skills. The QUASAR research (Silver and Stein, 1996) reported that students' learning gains were greatest in classrooms in which instructional tasks consistently encouraged high-level student thinking and reasoning (conceptual teaching) and least in classrooms in which instructional tasks were consistently procedural in nature. Effective instruction begins with the realization that students learn best when they are actively engaged in the process (Stiff, 1997).

- Providing students with many opportunities to engage in collaborative work and academic discourse. English learners and Standard English learners, in particular, benefit greatly from opportunities to: (1) discuss what they are learning; and (2) explain and justify their thinking. (Gibbons, *Scaffolding Language, Scaffolding Learning*).
- Providing teachers the opportunity to engage in critical reflection of their current instructional practice (*Implementation of the A-G Initiative 2006-07 Final Report*).
- Providing teachers with on-line pedagogical support resources for Algebra 1 such as *Agile Mind*, a product of the Charles A. Dana Center at the University of Texas at Austin, and highlighted as a “Practice Worthy of Attention” for its demonstrated success in improving student academic achievement in Algebra 1 in, for example, the Rio Grande area of Texas.
- “Programs that affect daily teaching practices and student interactions have more promise than those emphasizing textbooks or technology alone.” (Robert Slavin, et al. A summary of that review can be found here: [http://www.bestevidence.org/math/math\\_MS\\_summary.htm](http://www.bestevidence.org/math/math_MS_summary.htm))

Beyond what the research says about best practice, it should be noted that over the past several years, Board members have raised critical questions regarding the District’s policies regarding Algebra. Below, excerpts from selected memos and informatives are summarized that shed light on practices the District has adopted to promote student achievement in math. Although the referenced documents do not provide evidence in support of the stipulated practices, presumably the District viewed these adopted practices as “best.”

*Algebra Readiness:* Because of the high rate of failure in Algebra 1, beginning the 2006-07 school year the District modified its policy. Specifically, 8<sup>th</sup> graders could enroll in either Algebra 1 AB (two semesters) or Algebra Readiness (a one-year course designed to prepare 8<sup>th</sup> grade students for Algebra). The recommended curriculum for Algebra Readiness is Bridge to Algebra (Carnegie Learning). Bridge to Algebra focuses on implementation of a textbook component (60% of class time) in a cooperative classroom setting as well as a computer-based component (40% of class time). During the first semester of 2006-07, 22,706 8<sup>th</sup> graders enrolled in Algebra Readiness, of whom 62% passed with a grade of “C” or better.<sup>2</sup>

*Professional development:* (a) In 17 high schools, the District piloted Algebra 1 concept lesson development and implementation through PRISMA; (b) the central office provided training for each of the Algebra 1 instructional units to the 130+ math coaches, including concept lessons, periodic assessments and pedagogy. In turn, the coaches trained

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<sup>2</sup> See LAUSD MEM-3410.0, Robert Collins, Algebra Readiness Course, November 27, 2006 and Division of Secondary Instruction, Math Unit, presentation to Curriculum and Instruction and Educational Equity Committee meeting, dated May 31, 2007.

teachers in their respective schools and local districts;<sup>3</sup> (c) administrators (Directors, Principals, and Assistant Principals) were also expected to be trained in the concept lessons so that they would know what to look for, understand how to support teachers, and be able to participate with the school math team in discussions centered around Periodic Assessment results and looking at student work;<sup>4</sup> (d) the District piloted Achievement Solutions in 15 secondary schools (expanded to 75 schools in 2007-08);<sup>5</sup> and (e) an evaluation of these professional development initiatives was scheduled to be conducted following the CST administered in May 2007.<sup>6</sup>

*Class size reduction:* The District spends about \$10 million annually to reduce middle school average class size to 29.6 and high school average class size to 27.2. Class size reduction appears to have little impact on the passing rate of Algebra 1 students.<sup>7</sup>

*Bridge Programs for Algebra:* The District employs the Bridge Program for the transition from ES to MS and from MS to HS. The program is implemented at all summer school sites. Nearly 5,000 (elementary) and about 3,200 secondary students participate annually. With respect to curriculum, the Compass Learning Curriculum was used for the ES-to-MS program and Carnegie Learning's Cognitive Tutor curriculum guided the MS-to-HS program.<sup>8</sup>

*Proficiency First Algebra Model:* Under this model, the curriculum is divided into four units and 16 standards. Students complete standards at their own pace. Students have access to multiple pathways to demonstrate proficiency in Algebra (e.g., in-school – during class, after-school intervention, at home on the internet). The model is aligned to the Algebra 1 Cognitive Tutor program supported by Bridge to Algebra (Carnegie Learning). The model extends time to complete the Algebra course after-school, during intersession or during the summer, and it keeps students enrolled in the Algebra class until they reach proficiency.<sup>9, 10</sup>

*Departmentalization/Teaming 4<sup>th</sup> and 5<sup>th</sup> grade math:* A task force met to explore the feasibility of departmentalization, but made no recommendations. Twelve LAUSD elementary schools were identified as employing some degree of departmentalization. School calendars and size present a challenge for departmentalization/teaming. While no evidence is yet available, the working hypothesis is that school culture determines the effectiveness of departmentalization/teaming.<sup>11</sup>

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<sup>3</sup> Any data documenting the extent to which on-site training was done?

<sup>4</sup> Communication from Dr. Shelley Weston, July 10, 2008.

<sup>5</sup> From presentation to Curriculum and Instruction and Educational Equity Committee meeting, dated May 31, 2007, by Division of Secondary Instruction, Math Unit.

<sup>6</sup> Robert Collins, "Algebra – Promoting Student Achievement," LAUSD Board Informative, April 4, 2007:

<sup>7</sup> See Collins, April 4, 2007.

<sup>8</sup> Ibid.

<sup>9</sup> Ibid.

<sup>10</sup> Division of Secondary Instruction's May 31, 2007, presentation to CIEEC.

<sup>11</sup> See Collins, April 4, 2007.

*Periodic Assessment.* Ideally, schools and teachers would make ample use of ongoing findings from the Periodic Assessment for math to help guide support to individual students and teachers. However, the extent to which schools and teachers make effective use of Periodic Assessment data is not clear.

### **Concluding Remarks**

Since 2002, the District/state policy requiring that all students take and pass Algebra 1 has proven enormously challenging to implement successfully. Virtually all LAUSD 8<sup>th</sup> and/or 9<sup>th</sup> grade students now take Algebra 1, but the course failure rate is unacceptably high. While the District has taken numerous actions to address this challenge, student performance remains stubbornly low. Given the ongoing shortage of math teachers in LAUSD, implementation of the California Board of Education's new mandate that all 8<sup>th</sup> graders take Algebra will sorely test the District's ability to retain math teachers and provide high-quality instruction in Algebra to all 8<sup>th</sup> graders.

In addition to the program and evaluation strategies employed to date, we propose that District researchers identify middle schools and classrooms where students enjoy high levels of success in Algebra 1 and develop case studies that focus on the panoply of factors that come together to culminate in effective Algebra instruction. Moreover, such case studies would attempt to assess the extent to which the identified strategies could be successfully transferred to schools with similar students.

## APPENDIX

### **How Many Students Enrolled in Algebra 1 Last Year Were Repeating Algebra 1?**

Jordan Rickles  
November 2, 2006

The A-G Advisory Committee asked PERB to determine how many students enrolled in Algebra 1 last year (2005-06 school year) were repeating Algebra 1. We took the following steps to answer this question:

- Identify all students enrolled in at least one semester of Algebra 1A or 1B (including the last semester of the 2-Year Algebra course, 1B2) during the 2005-06 school year;
- Compile semester course enrollment data from the 1999-00 thru 2005-06 school years from the Secondary Student Information System (SIS) for each student;
- Identify whether a student took Alg 1A or 1B more than once by the end of the 2005-06 school year.
- Note that the SIS data do not include courses taken during inter-session or outside of LAUSD.

The table on the following page presents the results by student subgroup, school calendar, and year students entered high school (or expected to enter high school).

- Of the 89,675 students enrolled in Alg. 1A in 2005-06, 43% were repeating Alg. 1A.
- Among the 30,099 English Learners enrolled in Alg. 1A in 2005-06, 51% were repeating Alg. 1A.
- Among the 34,765 students who entered 9th grade in 2005-06 and enrolled in Alg. 1A, 61% were repeating Alg. 1A.
- Of the 70,526 students enrolled in Alg. 1B in 2005-06, 38% were repeating Alg. 1B (or had enrolled in Alg. 1B2 in a prior semester).

**Students Enrolled in Algebra 1 During the 2005-06 School Year:  
Percent First Time Enrolled or Repeating Algebra 1**

			Algebra 1A			Algebra 1B		
			# Enroll	% First	% Repeat	# Enroll	% First	% Repeat
LAUSD	By Subgroup	All Students	89,675	57%	43%	70,526	62%	38%
		African American	10,198	61%	39%	7,587	65%	35%
		Hispanic/Latino	68,211	54%	46%	52,773	59%	41%
		White	6,009	73%	27%	5,394	75%	25%
		English Learners	30,099	49%	51%	20,768	55%	45%
		RFEP	29,436	60%	40%	25,801	63%	37%
		IFEP	6,114	65%	35%	5,221	69%	31%
		English Only	24,026	63%	37%	18,736	68%	32%
		Students w/ Disabilities	6,772	55%	45%	4,637	62%	38%
	By School Calendar	Traditional Calendar	50,017	62%	38%	39,558	66%	34%
		3-Track A	15,040	50%	50%	11,622	54%	46%
		3-Track B	11,868	47%	53%	9,443	53%	47%
		3-Track C	10,396	50%	50%	8,403	58%	42%
		4-Track A	1,027	100%	0%	601	100%	0%
		4-Track B	386	99%	1%	223	100%	0%
		4-Track C	519	100%	0%	320	100%	0%
		4-Track D	422	88%	12%	356	83%	17%
	By HS Class	Entering HS Class of 2002-03 (Gr. 12)	1,879	31%	69%	2,144	26%	74%
		Entering HS Class of 2003-04 (Gr. 11)	4,575	20%	80%	4,827	26%	74%
		Entering HS Class of 2004-05 (Gr. 10)	11,363	21%	79%	10,238	32%	68%
		Entering HS Class of 2005-06 (Gr. 9)	34,765	39%	61%	25,398	46%	54%
		Entering HS Class of 2006-07 (Gr. 8)	34,136	91%	9%	25,144	97%	3%
		Entering HS Class of 2007-08 (Gr. 7)	2,652	100%	0%	2,403	100%	0%

Notes: The number and percent of students enrolled in Alg. 1B includes students enrolled in the second year of the 2-Year Algebra course (Alg. 1B2). Enrollment and percentages do not include inter-session courses or courses taken outside of LAUSD.

Source: Secondary Student Information System (SIS), 1999-00 through 2005-06, LAUSD.