Achieve

Report

American Diploma Project (ADP) End-of-Course Exams: 2010 Annual Report

September 2010

Introduction

At the time of the National Education Summit on High Schools in 2005, few states had aligned their expectations with real world demands[1]; today, 44 states and the District of Columbia have adopted college- and career-ready standards in English and mathematics.[2] Moreover, 21 states and the District of Columbia[3] specifically require students to study mathematics through Algebra II or its equivalent in order to earn a high school diploma. These policies are well grounded; advanced mathematics courses improve access to postsecondary education, reduce the need for remediation and significantly increase the odds that a student will earn a degree. Particularly for disadvantaged students, advanced mathematics coursework in high school significantly narrows the equity gap, improving access and success in college and in future economic opportunities.[4]

While many states and districts have been hard at work on the college- and career-ready agenda for years, the federal government has recently reinforced those efforts most notably by creating the Race to the Top competitive grant competition. The grants, including those for states and common assessment consortia, have the potential to significantly accelerate the college- and career-ready agenda and reflect a new reality: college and career readiness is increasingly becoming the expectation for all high school graduates in the United States.

Background

To assess the raised expectations of college and career readiness for all students, a group of American Diploma Project (ADP) Network states formed the ADP Assessment Consortium in 2005. The Consortium created Algebra I and II end-of-course exams, based in large part on Achieve's ADP mathematics benchmarks, which would provide an honest assessment of whether a student has mastered the content in the course they just completed and whether the student is prepared for higher-level mathematics coursework.

The ADP Assessment Consortium is a group of fifteen states, all of which are part of the American Diploma Project[5] Network—Arkansas, Arizona, Florida, Hawaii, Indiana, Kentucky, Maryland, Massachusetts, Minnesota, New Jersey, North Carolina, Ohio, Pennsylvania, Rhode Island and Washington. These states voluntarily banded together with the goal of creating high-quality, rigorous mathematics assessments aligned to their increased expectations, including an assessment that could serve as an indication of readiness for college mathematics.[6] It is important to note that while all 15 states have been involved in the development of the exams, each state decides each year whether to give the exam(s). In recent years, this is a decision that has been heavily influenced by policy priorities and budget restraints.

In 2006, the ADP Consortium states, with Ohio serving as the lead state, participated in a joint procurement for the development of an Algebra II end-of-course assessment. Pearson, after a competitive bidding process,

1 *Closing the Expectations Gap 2010*, http://www.achieve.org/ClosingtheExpectationsGap2010
2 http://www.corestandards.org/in-the-states for the 36 states and the District of Columbia that have adopted the CCSS. As of this writing, the following states have not adopted the CCSS but have college- and career-ready standards verified by Achieve: Alabama, Maine, Minnesota, Nebraska, New Mexico, Oregon, Texas and Virginia.
3 To see a full list of the states with college- and career-ready graduation requirements in English and mathematics as well as the specific course requirements and the dates that such requirements are effective, please go to http://www.achieve.org/state-graduation-requirements-table
4 http://www.achieve.org/files/BuildingBlocksofSuccess.pdf
5 For more information about Achieve's American Diploma Project, go to http://www.achieve.org/files/AboutADP.pdf.
6 A fuller description of the background of the exams and their development can be found at http://www.achieve.org/ADPAssessment-Consortium

was chosen as the test developer. Subsequently, the Consortium developed Algebra I exam standards and an aligned Algebra I exam.

Since the tests reflected states' raised expectations they were more challenging than the exams that were being given in most states and Consortium members, therefore, anticipated that early test results would be low. Nevertheless, the Consortium recognized the importance of aiming high—challenging themselves, their systems and their schools to improve secondary mathematics education so that their high school graduates would be prepared for success in college and careers. In developing the exams, all participating states were guided by three main purposes:

- To develop high quality exams that would ensure a consistent level of content and rigor within and across states in their Algebra I and II courses;[7]
- To improve the quality of curriculum and instruction in Algebra I and II courses, within and across states; and
- To examine students' mastery of the content in the course they completed and to provide an indicator of students' readiness for success in mathematics at the next level. With respect to Algebra I, that means providing an indicator for readiness in a higher-level mathematics course, such as Algebra II. For students completing the Algebra II exam, the exam provides an indicator of readiness for the first credit-bearing college mathematics course, typically College Algebra.

The ADP Assessment Consortium states have shown that multistate partnerships can create challenging exams that deliver honest results and can be a vehicle for driving change. In many respects, the ADP Assessment Consortium, along with the New England Common Assessment Program (NECAP), paved the way for the newly-formed state common assessment consortia that have recently received Race to the Top funding to create next generation assessment systems.

Spring 2010 Administration

The spring 2010 administration marked the second administration of the Algebra I exam. This year, four of the Consortium states participated in the Algebra I exam—Minnesota, New Jersey, Ohio and Rhode Island—administering the exam to over 110,000 students (see Table 1). Most states are continuing to pilot the exam, allowing districts to choose whether to administer the exam. It is important to note that there are no stakes—for students or schools—tied to the results of the exam in any state at this time. However, New Jersey is moving toward making the exam a graduation requirement for its students and this year required all students enrolled in an Algebra I course to take the ADP Algebra I End-of-Course Exam.

The ADP Algebra II End-of-Course Exam was administered for the third time. This year, nine of the Consortium states participated in the Algebra II exam—Arkansas, Hawaii, Indiana, Kentucky, Maryland, New Jersey, North Carolina, Ohio and Rhode Island—administering the exam to over 40,000 students (see Table 1). As with Algebra I, most states are continuing to pilot the exam, allowing districts to choose whether to administer the exam. Since 2008, Arkansas and Hawaii have administered the exam to all students who are enrolled in an Algebra II course. It is important to note that there are no stakes—for students or schools—tied to the results of the exam. In the future, Hawaii plans to use the exam scores as a placement tool in their higher education system.

7 "Algebra I" and "Algebra II" are common course titles for courses containing the beginning and advanced algebra content normally found in such courses. The content tested in the Algebra I and II exams is also covered in courses with different course titles such as Integrated Mathematics.

TABLE 1: ALGEBRA I AND ALGEBRA II PARTICIPATION, BY STATE

State	Algebra I Exam Participants	Algebra II Exam Participants
Consortium	113,345	40,111
Arkansas*	Did Not Administer	25,464
Arizona	Did Not Administer	Did Not Administer
Florida	Did Not Administer	Did Not Administer
Hawaii*	Did Not Administer	7,292
Indiana*	Did Not Administer	See Note
Kentucky	Did Not Administer	977
Maryland	Did Not Administer	1,138
Massachusetts	Did Not Administer	Did Not Administer
Minnesota	61	Did Not Administer
New Jersey*	111,103	2,216
North Carolina	Did Not Administer	2,094
Ohio	126	81
Pennsylvania	Did Not Administer	Did Not Administer
Rhode Island	2,055	845
Washington	Did Not Administer	Did Not Administer

**Note: New Jersey required all students taking an Algebra I course to take the exam. Arkansas and Hawaii required all students taking an Algebra II course to take the exam. Indiana participated in the Algebra II administration, but too few students took the exam to report scores at the state level.*

Spring 2010 Results

The spring 2010 administration was the first administration for both exams after performance standards were set and cut scores were determined. On the Algebra I exam, cut scores were established to determine at what level a student is performing in relation to the Algebra I content standards established by the Consortium: "below basic," "basic," "proficient," or "advanced." On the Algebra II exam, student performance levels were set at "well prepared," "prepared" or "needs preparation" to reflect students' readiness to enroll in a first-year, credit-bearing college mathematics course. Full descriptions of the performance levels and the standard setting process for both exams can be found in the *American Diploma Project (ADP) End-of-Course Exams: 2009 Annual Report*.[8] The following conclusions can be drawn from the spring 2010 administration:

STUDENT PERFORMANCE WAS LOW ACROSS THE CONSORTIUM FOR BOTH EXAMS As shown in Table 3, performance on the 2010 Algebra I exams was low across the participating consortium states. On the Algebra I exam, only 28.9% of the 113,345 students tested performed at the *Proficient* or *Advanced* levels, whereas nearly half of the students in the Consortium scored at the *Below Basic* level.

TABLE 3: ALGEBRA I: PERCENT OF CONSORTIUM STUDENTS IN EACH PERFORMANCE LEVEL

	Total Students Tested	Advanced (850—575)	Proficient (574—450)	Basic (449—387)	Below Basic (386—300)	Average Scale Score (Standard Deviation)
Consortium	113,345	4.8%	24.1%	24.8%	46.4%	406 (86)

Note: Because populations of test takers were not consistent across participating states, only Consortium-level information is being reported. Under such conditions, cross-state comparisons are not valid.

In Algebra II, shown in Table 4, of the 40,111 students tested, only 13.3% performed at the *Prepared* or *Well Prepared* levels. Consortiumwide, 86.7% of students tested performed at the *Needs Preparation* level.

TABLE 4: ALGEBRA II: PERCENT OF CONSORTIUM STUDENTS IN EACH PERFORMANCE LEVEL

	Total Students Tested	Well Prepared (1650—1275)	Prepared (1274—1150)	Needs Preparation (1149—900)	Average Scale Score (Standard Deviation)
Consortium	40,111	3.3%	10.0%	86.7%	1024 (108)

Note: Because populations of test takers were not consistent across participating states, only Consortium-level information is being reported. Under such conditions, cross-state comparisons are not valid.

8 http://achieve.org/2009ADPAnnualReport

PERFORMANCE WAS LOW ACROSS ALL CONTENT STANDARDS IN BOTH EXAMS Content standard mastery results, provided in Tables 5 and 6, show that performance is consistently low across all of the content standards. On the Algebra I test, the mastery level results ranged from 25.0% in *Data, Statistics, and Probability* to 36.8% in *Non-linear Relationships*. At the consortium level, the percentage of students reaching the mastery level on the Algebra II content standards ranged only from 16.1% in *Operations on Numbers and Expressions* to 23.6% in *Exponential Functions*. No content standard can be labeled as a strength on either exam. These content standard results are based on a small number of items and are, therefore, less reliable than the overall exam results and must be interpreted cautiously.

TABLE 5: ALGEBRA I: PERCENT OF CONSORTIUM STUDENTS AT MASTERY LEVEL[9], BY CONTENT STANDARD

	Total Students Tested	Operations on Numbers and Expressions	Linear Relationships	Non-linear Relationships	Data, Statistics, and Probability
Consortium	113,345	32.0%	35.6%	36.8%	25.0%

Note: Because populations of test takers were not consistent across participating states, only Consortium-level information is being reported. Under such conditions, cross-state comparisons are not valid.

TABLE 6: ALGEBRA II: PERCENT OF CONSORTIUM STUDENTS AT MASTERY LEVEL, BY CONTENT STANDARD

	Total Students Tested	Operations on Numbers and Expressions	Equations and Inequalities	Polynomial and Rational Functions	Exponential Functions	Function Operations and Inverses
Consortium	40,111	16.1%	18.3%	19.5%	23.6%	22.3%

Note: Because populations of test takers were not consistent across participating states, only Consortium-level information is being reported. Under such conditions, cross-state comparisons are not valid.

PERFORMANCE ON CONSTRUCTED RESPONSE IS POOR On both the Algebra I and Algebra II exams, students are continuing to perform poorly on the constructed response items, often leaving the answer space blank (see Table 7). These items—requiring students to produce their own answer, such as needing to show their work or justify an answer—include both longer, multi-step extended response items and short answer items and count towards at least 30% of each exam's score. It cannot be determined if the poor performance on the items is due to students being unfamiliar with the content and mathematics asked of them or to a lack

9 The masterly level for each content standard is determined through a statistical process that compares student performance on the set of items within each content standard to the Proficient (for the ADP Algebra I exam) or Prepared (for the ADP Algebra II exam) performance standard established for the overall exam.

of motivation, possibly tied to the lack of stakes attached to these exams. Studies to further analyze the results are being planned.

TABLE 7: STUDENT PERFORMANCE ON CONSTRUCTED RESPONSE ITEMS, BY ITEM TYPE

	Algebra I	Algebra II
Average Percent of Constructed Response Points Earned	18.1% (18 points available)	10.5% (24 points available)
Percent of Students that Scored 0 Points on All Constructed Response Items	23.4%	34.6%
Percent of Students that Scored 0 Points on Extended Response Items	33.5%	54.8%
Percent of Students that Scored 0 Points on Short Answer Items	42.0%	46.7%
Percent of Students that Left All Constructed Response Items Blank	2.0%	3.1%
Percent of Students that Left All Extended Response Items Blank	7.8%	7.9%
Percent of Students that Left All Short Answer Items Blank	2.4%	3.7%

NOTE: On the 2010 Algebra I Exam, there were 2 four-point extended response (8 points total) and 5 two-point short answer (10 points total). On the 2010 Algebra II Exam, there were 3 four-point extended response (12 points total) and 6 two-point short answer (12 points total).

STUDENTS WHO TAKE ALGEBRA I AND ALGEBRA II IN EARLIER GRADES PERFORM BETTER ON THE EXAMS In general, students who take higher-level mathematics courses in earlier grades perform better than students who take the same course(s) later in their high school career (see Tables 8 and 9). This is most likely because students who are prepared to take the courses in the earlier grades are the strongest and most advanced mathematics students, while those who take the courses toward the end of high school tend to struggle more in mathematics.

TABLE 8: ALGEBRA I: PERCENT OF STUDENTS IN EACH PERFORMANCE LEVEL, BY GRADE

Grade Level	Total Students Tested	Advanced (850–575)	Proficient (574–450)	Basic (449–387)	Below Basic (386–300)	Average Scale Score (Standard Deviation)
Grade 6	59	37.3%	33.9%	18.6%	10.2%	527 (107)
Grade 7	2,921	34.1%	54.1%	9.0%	2.8%	542 (85)
Grade 8	31,634	12.5%	48.8%	23.3%	15.4%	473 (87)
Grade 9	64,681	0.7%	14.9%	27.6%	56.8%	379 (64)
Grade 10	10,161	0.1%	4.2%	18.4%	77.3%	350 (47)
Grade 11	2,865	0.1%	5.5%	18.4%	76.0%	352 (50)
Grade 12	908	0.0%	3.6%	15.1%	81.3%	345 (46)
Not Identified	116	0.9%	5.2%	8.6%	85.3%	343 (62)
Consortium	**113,345**	**4.8%**	**24.1%**	**24.8%**	**46.4%**	**406 (86)**

TABLE 9: ALGEBRA II: PERCENT OF STUDENTS IN EACH PERFORMANCE LEVEL, BY GRADE

Grade Level	Total Students Tested	Well Prepared (1650—1275)	Prepared (1274—1150)	Needs Preparation (1149—900)	Average Scale Score (Standard Deviation)
Grade 9	2,277	13.5%	22.9%	63.6%	1112 (142)
Grade 10	12,106	6.4%	18.5%	75.1%	1070 (120)
Grade 11	19,596	1.0%	5.6%	93.4%	1000 (86)
Grade 12	5,814	0.4%	1.9%	97.7%	971 (70)
Consortium	**40,111**	**3.3%**	**10.0%**	**86.7%**	**1024 (108)**

Note: There were a small number of grade 7 and grade 8 students that participated in the Algebra II Exam, but the populations of students were not large enough to make any valid conclusions.

Conclusion

While it is clear that students continue to struggle with the ADP Algebra I and Algebra II End-of-Course Exams, it is also clear that these tests represent the mathematics knowledge students will need to succeed in college and careers after high school. These exam results reflect the challenges ahead of achieving the Consortiumwide goal of graduating all students from high school prepared for first year, credit-bearing college coursework in mathematics. States in the ADP Assessment Consortium have taken an important step in reaching that goal by developing and administering an honest assessment. With that information in hand, states can begin the hard work of improving student performance and moving closer to the goal of college and career readiness for all.

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