



A status report on middle school mathematics assessment and student achievement in the Pacific Region



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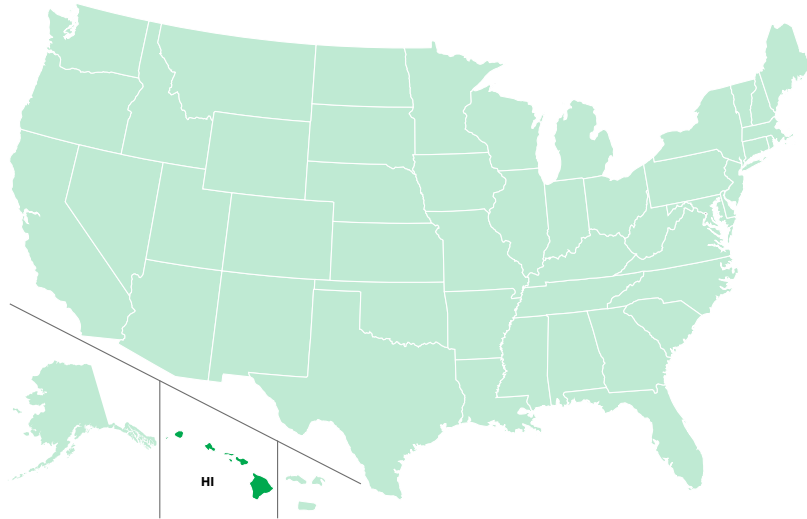
A status report on middle school mathematics assessment and student achievement in the Pacific Region

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Prepared by

Roger Chesswas, PhD
Pacific Resources for Education and Learning

Lesley Lee, PhD
Pacific Resources for Education and Learning



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Summary

A status report on middle school mathematics assessment and student achievement in the Pacific Region

This study answers one basic question: What is the status of student achievement in middle school mathematics in the Pacific Region jurisdictions? The findings provide a portrait of the types of mathematics assessments used in grades 7 and 8 and of how well students are performing.

In addressing the question of mathematics achievement in middle school in the Pacific Region jurisdictions, Pacific Regional Educational Laboratory researchers found that student achievement data are not uniformly available.

This study relied on two main sources of data: state education agency web sites in the Pacific Region and, when online data were not available, structured interviews with key state education agency testing and assessment staff.

Analysis of these data suggests that student achievement in middle grade mathematics is below the national average, confirming a U.S. Department of Education (2002) study that indicates that student achievement in mathematics is lower in the Pacific Region than in most other parts of the United States.

More specifically, in assessment procedures,

- State education agencies vary in the grades in which they assess mathematics achievement, but all jurisdictions assess mathematics achievement in either seventh or eighth grade—or both.
- Hawai'i and the territories use established standardized tests or items from these tests, such as the Stanford Achievement Test (SAT), while the freely associated states use state-developed assessments or a combination of both.
- Where mathematics achievement data are available, most jurisdictions have data for three or more years.

while in assessment results,

- In jurisdictions with data for several years student achievement scores show little improvement in recent years.
- Little is known about what factors influence mathematics achievement in the Pacific Region.
- If policymakers' desire to understand possible variations in mathematics achievement across the Pacific Region is to be addressed, a necessary first condition is to develop more consistent, comparable measures of mathematics achievement across the jurisdictions.

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This study answers one basic question: What is the status of student achievement in middle school mathematics in the Pacific Region jurisdictions? The findings provide a portrait of the types of mathematic assessments used in grades 7 and 8 and of how well students are performing.

WHY THIS STUDY?

This study is driven by the question: What is the status of student achievement in middle school mathematics in the Pacific Region?

A descriptive and awareness-building study, it examines the kinds of mathematics assessments that the Pacific Region jurisdictions use to measure mathematics achievement in grades 7 and 8 and the results of those assessments. One aim is to inform directors, ministers, and superintendents of education; curriculum and assessment directors; and communities and parents of what other jurisdictions are doing to assess mathematics achievement and of how well other students are doing in mathematics across the region and to assist education policymakers and administrators in evaluating their own mathematics assessment practices.

Two main sources of data were used for this study: state education agency web sites in the Pacific Region and, when online data were not available, structured interviews with key state education agency testing and assessment staff (see box 1 and appendix A). Researchers examined the kinds of mathematics assessments used, how data are reported, and how well seventh and eighth grade students are performing.

Because of lack of data and assurances of the quality of data in some state education agencies, there are some gaps in the summaries of the findings on mathematics achievement. More important, for the state-developed assessments, the technical properties (reliability and validity estimates and item statistics) of the assessments are not known. Hence the data across jurisdictions are *not comparable*, and *no conclusions* should be drawn based on comparisons across jurisdictions.

The study focuses on student mathematics achievement in grades 7 and 8 because these are critical years in many Pacific Region jurisdictions and the last chance to study student achievement of the entire school population. Because of resource limitations, many education agencies require student attendance only through grade 8. Examinations at the end of grade 8 determine whether students will continue on to high school or drop out.

BOX 1

Data collection and assessment information

Data for this study came from state education agency published reports and web sites and from structured interviews with state education agency testing and assessment staff. Availability of these data sources differed by jurisdiction, and different collection strategies were applied in order to obtain all the information that was available in the region.

Four of the jurisdictions in the Pacific Region (Hawai'i, American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam) use established standardized tests, and the remaining jurisdictions use state-developed assessments of mathematics achievement. Nine of the ten jurisdictions administer achievement tests to eighth graders, one jurisdiction assesses seventh graders only, and two jurisdictions assess seventh and eighth graders.

Hawai'i. Hawai'i is the only Pacific Region jurisdiction that is obligated to comply fully with the accountability regulations of the No Child Left Behind Act of 2001. Data for Hawai'i, from published reports accessed through the Hawai'i Department of Education web site, include

reports on adequate yearly progress results and accountability status, the superintendent of education's annual reports, trend reports, fiscal accountability reports, and state summaries of school reports.

American Samoa. Interviews with key American Samoan Department of Education (ASDOE) staff and annual reports available at the ASDOE in Pago Pago were the main sources of data. The ASDOE director of assessment provided SAT-10 test results for the 2003/04–2005/06 school years. The ASDOE is developing assessments for reading and mathematics based on local standards, but results of those tests were not available for this report.

Commonwealth of the Northern Mariana Islands. The Commonwealth of the Northern Mariana Islands Public School System provided data for this study through its web site and its Pacific Educational Data Management System (PEDMS) database. Grade 8 students are assessed through the SAT-10.

Guam. Data came from the Guam Public School System web site, which has SAT-10 scaled scores for mathematics by grade levels and school report cards for the 2004/05 school year.

Republic of the Marshall Islands. Mathematics specialists in the Republic of the Marshall Islands Ministry of Education provided copies of and results for the 2005 and 2006 administrations of the Marshall Island Student Achievement Test (MISAT), which is given in grade 8.

Federated States of Micronesia. The national Department of Education requires the four state education agencies to administer the National Standardized Test to all students in grades 6, 8, and 10.

National data were gathered through meetings with Federated States of Micronesia Health, Education, and Social Affairs officials. Of the four states within the Federation, Pohnpei and Yap provided state results on the National Standardized Test while state data were unavailable from Kosrae and Chuuk.

Republic of Palau. The director of Research and Evaluation in the Palau Ministry of Education provided data for this report. Palau administers the Palau Achievement Test in mathematics in grade 8. Though the Ministry of Education is developing a student achievement database and web site, mathematics achievement data were not available for this study.

In the absence of other relevant research on this topic in this region this study provides an important regional perspective on the status of student achievement in middle school mathematics that is sorely needed as a basis for future research and development by the education agencies in the Pacific Region. The findings provide a portrait of the extent and types of mathematic assessments

in grades 7 and 8 and of how well students are performing.

The findings of this study will be of special interest to state education agency and jurisdictional policymakers as they implement school reform measures across their systems and assess how well their students are meeting high standards

of excellence. In addition, the report will interest teachers, school administrators, parents, and communities who are curious about how well their students are doing in mathematics and how state education agencies measure student achievement.

FINDINGS BY JURISDICTION

The following findings report on the status of student achievement in grades 7 and 8 mathematics for the U.S.-affiliated Pacific Region education agencies: the state of Hawai'i; the territories of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam; and the freely associated states of the Republic of the Marshall Islands, the Republic of Palau, and the Federated States of Micronesia, which include Chuuk, Kosrae, Pohnpei, and Yap.

Hawai'i

Grade 8 results on the Hawai'i State Assessment standards-based test report four levels of performance: exceeds (level 4), meets (level 3), approaches (level 2), and well below (level 1) standards. These assessments are available only for grade 8 in all three years (grade 7 testing began only in 2006). Mathematics achievement remained fairly stable over 2003/04–2005/06, with between 17 percent and 20 percent of eighth grade students exceeding or meeting performance standards and with little change in those performing well below standards (table 1).

Although the SAT–9 items are integrated into the Hawai'i State Assessment, the results on the SAT–9 items are also reported separately. Results on the SAT–9 items in mathematics for 2003/04–2005/06 also remained stable (table 2). The SAT–9 test in mathematics uses three categories for achievement: above average, average, and below average. The results are slightly below the national norm of 77 percent for students who score in the categories average and above average (Hawai'i Department of Education, 2006c).

TABLE 1

Hawai'i State Assessment grade 8 mathematics results, 2003/04–2005/06 (percentage of students scoring in each category)

Year	Exceeds standards	Meets standards	Approaches standards	Well below standards
2003/04	1	16	55	28
2004/05	2	18	52	28
2005/06	2	18	52	27

Note: Totals may not sum to 100 due to rounding.

Source: Hawai'i Department of Education (2006c, d).

TABLE 2

Hawai'i: Stanford Achievement Test–9 grade 8 mathematics results, 2003/04–2005/06 (percentage of students scoring in each category)

Year	Above average	Average	Below average
2003/04	20	53	27
2004/05	22	53	26
2005/06	21	53	26

Note: These are norm-referenced scores (based on national mean scores), which include the categories above average, average, and below average.

Source: Hawai'i Department of Education (2006c)

Table 3 summarizes the grade 8 results on the Hawai'i State Assessment, the SAT–9 items, and National Assessment of Educational Progress (NAEP; Hawai'i Department of Education, 2006a). All three show little change in mathematics achievement over 2003/04–2005/06.

Hawai'i's proficiency scores were consistently 11 percentage points below the national NAEP average for 2003 (16 percent in Hawai'i compared with 27 percent nationally) and for 2005 (18 percent in Hawai'i compared with 29 percent nationally).

Hawai'i ranks nearly last among the states in student achievement in mathematics at all levels, including the middle school grades, and that changes very little over time.

TABLE 3

Hawai'i: comparison of grade 8 mathematics results for Hawai'i State Assessment, Stanford Achievement Test–9, and National Assessment of Educational Progress, 2003/04–2005/06 (percentage of students scoring in each category)

Year	Grade	Hawai'i State Assessment Meets or exceeds proficiency	Stanford Achievement Test–9 ^a Average or above average	National Assessment of Educational Progress Proficient or advanced
2003/04	8	17	73	16
2004/05	8	20	75	17
2005/06	8	20	74	18

a. These are norm-referenced scores (based on national mean scores), which include the categories above average, average, and below average.

Source: Hawai'i Department of Education (2006a, b, c).

TABLE 4

American Samoa: Stanford Achievement Test–10 percentile scores and percentage of students in each scoring category for grades 7 and 8, 2003/04–2005/06

Year	Grade	Percentile score	Percentage of students scoring ^a		
			Above average	Average	Below average
2003/04	7	31	—	—	—
2004/05	7	31	—	—	—
2005/06	7	31	4	53	43
2003/04	8	39	—	—	—
2004/05	8	33	—	—	—
2005/06	8	39	11	60	29

— is not available.

a. These are norm-referenced scores (based on national mean scores), which include the categories above average, average, and below average.

Source: American Samoa Department of Education, 2006.

The territories

American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam are U.S. territories required to report annually on their public school systems. While required to satisfy certain aspects of the No Child Left Behind Act, they are not bound by all of its standards or reporting requirements. Achievement data and results available for middle school mathematics for the territories are incomplete.

American Samoa. Seventh and eighth grade mathematics students in American Samoa take the SAT–10 tests. Reports on results use percentile scores and the distribution of scores in three categories: above average, average, and below average. SAT–10 mathematics achievement

percentile scores for grades 7 and 8 are available for the 2003/04, 2004/05, and 2005/06 school years, but score breakdowns are available for 2005/06 only.

Percentile scores for seventh grade remained stable over 2003/04–2005/06 on the SAT–10 in mathematics (table 4). For grade 8 percentile scores declined from 39 to 33 and then rose back to 39. In the 2005/06 school year slightly less than 6 of 10 seventh graders (57 percent) scored average or above, and about 7 of 10 eighth graders (71 percent) scored average or above average.

Commonwealth of the Northern Mariana Islands.

In the Commonwealth of the Northern Mariana Islands SAT–10 mathematics achievement in grade 8 increased from 2003/04 to 2004/05 but then declined

TABLE 5

Commonwealth of the Northern Mariana Islands: Stanford Achievement Test–10 percentile rank scores and percentage of students scoring proficient or advanced for grades 7 and 8, 2003/04–2005/06

Year	Grade	Percentile rank score	Percentage proficient or advanced
2003/04	8	36	—
2004/05	8	39	—
2005/06	8	35	—
2004/05	7	—	36
2005/06	7	—	38

— is not available

Note: These are criterion-referenced scores, which include the categories advanced (superior performance beyond grade-level mastery), proficient (students are prepared for the next grade), basic (partial mastery of fundamental knowledge and skills), and below basic (little or no mastery).

Source: Commonwealth of the Northern Mariana Islands Public School System, 2006 (www.pss.cnmi.mp).

in 2005/06 (table 5). Mathematics achievement in grade 7 increased slightly from 2004/05 to 2005/06.

Guam. The 2004/05 SAT–10 test results for grades 7 and 8 in Guam show little difference in achievement between the two grades (table 6). Only 3 percent of seventh graders and 5 percent of eighth graders attained scores of advanced or proficient—the level of proficiency that indicates students are prepared for the next grade level (Guam Public School System, 2005). Most students showed little or no mastery of mathematics (80 percent in seventh grade and 76 percent in eighth grade).

Freely associated states

Republic of the Marshall Islands. The average mathematics score across all grade 8 students in the Republic of the Marshall Islands declined from 2004/05 to 2005/06 by 8 percentage points (table 7).

Federated States of Micronesia. Mathematics achievement data by state could not be obtained for two of the four states in the Federated States of Micronesia, Kosrae and Chuuk. The state data

TABLE 6

Guam: Stanford Achievement Test–10 results for grades 7 and 8, 2004/05 (percentage of students scoring in each category)

Year	Grade	Proficient or advanced (levels 3 and 4 ^a)	Basic (level 2)	Below basic (level 1)
2004/05	7	3	16	80
2004/05	8	5	19	76

a. No students attained the advanced level (level 4).

Note: These are criterion-referenced scores, which include the categories advanced (superior performance beyond grade-level mastery), proficient (students are prepared for the next grade), basic (partial mastery of fundamental knowledge and skills), and below basic (little or no mastery).

Source: Guam Public School System (2005).

TABLE 7

Republic of the Marshall Islands: average grade 8 mathematics scores across all participating students, 2004/05 and 2005/06

Year	Grade	Average mathematics score (percent)
2004/05	8	24
2005/06	8	16

Source: Joseph, Matsumoto, and Shikamura (2006).

TABLE 8

Federated States of Micronesia and Pohnpei and Yap: average mathematics scores across all grade 8 students, 2004/05 and 2005/06

Year	Grade	Federated States of Micronesia	Pohnpei	Yap
2004/05	8	53	56	27
2005/06	8	53	57	24

Sources: For Federated States of Micronesia and Pohnpei, Federated States of Micronesia Department of Health, Education, and Social Affairs (2006); for Yap, P. Legdesog, Department of Education database manager and math specialist for Yap state data.

presented here are for the states of Pohnpei and Yap, and the overall national data are from the Health, Education, and Social Affairs Office of the Federated States of Micronesia.

Mathematics achievement results remained stable for the Federated States of Micronesia as a whole and for the states of Pohnpei and Yap from

2004/05 to 2005/06 (table 8). However, whereas Pohnpei exceeds the national average, Yap falls well below it. This suggests a wide variation across the jurisdictions within the Federated States of Micronesia.

In an analysis of the 2005/06 test results Ministry of Education specialists found that 1 of 10 eighth-grade students (12 percent) in the Federated States of Micronesia had achieved “mastery,” which was interpreted as a score of 80 percent or more on the National Standardized Test of mathematics content, and two-thirds (67 percent) were not proficient (table 9).

Palau. Palau administers the Palau Achievement Test in mathematics in grade 8, but results for that test were not available.

FINDINGS ACROSS THE REGION

This section looks at the two main parts of the research question driving this study: what standardized tests are administered to seventh and eighth grade mathematics students in the Pacific Region and what the results on these tests are.

In Hawai'i and the territories of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam, some versions of SAT-9 or SAT-10 test items are administered to students. However, these are sometimes embedded in tests that address the jurisdictions' standards. The Marshall Islands, the Federated States of Micronesia, and the Republic of Palau administer their own state-developed tests. This difference in test in-

TABLE 9

Federated States of Micronesia: percentage of grade 8 mathematics students achieving mastery on the National Standardized Test, 2005/06

Year	Grade	Level of mastery (percentage score on test)		
		Mastery (80–100)	Significant improvement needed (60–79)	Not proficient (0–59)
2005/06	8	12	21	67

Source: Federated States of Micronesia Department of Health, Education, and Social Affairs (2006).

TABLE 10

Mathematics achievement results by jurisdiction, latest year available (percent of students)

Jurisdiction	Test	Year	Grade 7	Grade 8	Category of results
Hawai'i	Hawai'i State Assessment	2005/06	—	20	Exceeds or meets standards
	Hawai'i State Assessment SAT-9 items	2005/06	—	74	Above average or average
	National Assessment of Educational Progress	2005/06	—	18	Advanced or proficient
American Samoa	SAT-10	2006	57	71	Above average or average
Commonwealth of the Northern Mariana Islands	SAT-10	2005/06	38	—	Advanced or proficient
Guam	SAT-10	2004/05	3	5	Advanced or proficient
Federated States of Micronesia	National Standardized Test	2005/06	—	12	Mastery

— is not available.

Note: Mathematics achievement data for the Republic of the Marshall Islands, Pohnpei, and Yap are available only as average scores and are not categorized. There are no mathematics achievement data for Kosrae, Chuuk, and Palau.

Source: Tables 1–6 and 9.

struments makes any comparison of results across the Pacific Region jurisdictions impossible.

Some subset of results on test items might be comparable if state tests were publicly available, which they are not, and if results on each question were available as well. Jurisdictions that might be candidates for some comparisons are presented in table 10. Jurisdictions also vary in the way student achievement is categorized (proficient or not proficient, above or below average).

such as the SAT, while the freely associated states use state-developed assessments or a combination of both.

Little is known about what factors influence mathematics achievement in the Pacific Region

- Where mathematics achievement data are available, most jurisdictions have data for three or more years.

while in assessment results it finds that:

- In jurisdictions with data for several years student achievement scores in mathematics show little improvement in recent years.
- Little is known about what factors influence mathematics achievement in the Pacific Region.
- If policymakers' desire to understand possible variations in mathematics achievement across the Pacific Region is to be addressed, a necessary first condition is to develop more consistent, comparable measures of mathematics achievement across the jurisdictions.

CONCLUSIONS

This assessment of mathematics achievement across the Pacific Region reaches several conclusions. In assessment procedures it finds that:

- State education agencies vary in the grades in which they assess mathematics achievement, but all jurisdictions assess mathematics achievement in either seventh or eighth grade—or both.
- Hawai'i and the territories use established standardized tests or items from these tests,

**APPENDIX A
DATA COLLECTION**

Data for this study came from state education agency web sites and, when data were not available, from structured interviews with key state education agency testing and assessment staff, with occasional follow-up site visits. Because of differences in access and quality, state education agency data within the Pacific Region require a mix of data collection approaches. Table A1 summarizes the data sources available.

Four of the jurisdictions in the Pacific Region (American Samoa, the Commonwealth of the Northern Mariana Islands, Guam, and Hawai'i) use established standardized tests or test items, such as the Stanford Achievement Test and the National Assessment of Educational Progress (NAEP). State education agencies in the remaining six jurisdictions use state-developed assessments of mathematics achievement. Nine of the ten jurisdictions administer achievement tests to eighth graders, one jurisdiction (Commonwealth of the Northern Mariana Islands) assesses seventh graders only, and two jurisdictions (American Samoa and Guam) assess seventh and eighth graders.

Education (HIDOE) web site. Hawai'i is the only Pacific Region jurisdiction that is obligated to fully comply with the accountability regulations of the No Child Left Behind Act of 2001. Thus, the HIDOE has more incentive to collect, store, and share data, including achievement data. The data were collected from several sources, including reports on enrollment (Hawai'i Department of Education, 2005), adequate yearly progress results and accountability status by school cluster complex (Hawai'i Department of Education, 2006a), the superintendent of education's annual reports (Hawai'i Department of Education, 2006d), trend reports, and fiscal accountability reports. State summaries of school reports were also reviewed (Hawai'i Department of Education, 2006b).

The HIDOE uses two assessments for mathematics in grades 7 and 8. The Hawai'i State Assessment, a standardized test that includes customized, standards-based items aligned to Hawai'i Content and Performance Standards II (and requiring written justifications in mathematics) and components of the norm-referenced (multiple-choice) Stanford Achievement Test, ninth edition (SAT-9); and the NAEP tests, which are administered in grade 8.

Hawai'i

Data for Hawai'i came from published reports accessed through the Hawai'i Department of

Guam

Data came from the Guam Public School System web site (Guam Public School System, 2005). The web site has SAT-10 scaled scores for mathematics

TABLE A1
Summary of available data sources for Pacific Region jurisdictions

Research subquestions	Published report	Web site	State education officials or documents
1. What national tests are administered to students in grades 7 and 8 mathematics classes?	Hawai'i, American Samoa, Guam, Republic of the Marshall Islands, Palau	Hawai'i, Commonwealth of the Northern Mariana Islands, Guam	Federated States of Micronesia, American Samoa, Republic of the Marshall Islands
2. What are the grades 7-8 student results in mathematics on these tests over 2003/04-2005/06?	Hawai'i, American Samoa, Guama, Republic of the Marshall Islands ^a	Hawai'i, Commonwealth of the Northern Mariana Islands	Federated States of Micronesia, states of Pohnpei, Yap

a. Available only for 1 year.

b. These results are valid only to the extent that the teachers are representative of other mathematics teachers in the Republic of the Marshall Islands.

Source: See reference list for published reports and documents.

by grade and education level and school report cards for the 2004/05 school year.

American Samoa

Key American Samoan Department of Education (ASDOE) staff were interviewed, and ASDOE annual reports were reviewed (American Samoa Department of Education, 2006). The ASDOE director of assessment provided SAT–10 test results for the 2003/04–2005/06 school years. The ASDOE is developing assessments for reading and mathematics based on local standards, but those test results were not available for this report.

Federated States of Micronesia

National and state education web sites are not available in the Federated States of Micronesia, so data were gathered through meetings with Federated States of Micronesia Health, Education, and Social Affairs officials and the directors of the state departments of education in Kosrae, Pohnpei, Chuuk, and Yap. The Pohnpei state assessment coordinator, the Pohnpei state director of testing, and the Yap department of education database manager provided 2006/07 National Standardized Test data. Data were unavailable from the Kosrae and Chuuk departments of education.

The national education office of the Federated States of Micronesia requires the four state education agencies to administer the National Standardized Test to all students in grades 6, 8, and 10. The National Standardized Test covers English language arts, science, and mathematics. The Kosrae Department of Education administers the SAT–9. The Pohnpei Department of Education has developed its own state assessment, based on its own standards, for students in grades 3, 5, 7, 9, and 11, but to date the assessment covers only reading.

Republic of the Marshall Islands

The Republic of the Marshall Islands Ministry of Education (MOE) administers its own national test, the Marshall Islands Student Achievement Test (MISAT) for grades 3, 6, and 8. Mathematics specialists provided copies of and results for the 2004/05 and 2005/06 administrations of the MISAT.

Republic of Palau

The director of Research and Evaluation of the Palau Ministry of Education provided the data for this report. Palau administers the Palau Achievement Test in mathematics in grade 8. Though the Ministry of Education is developing a student achievement database and web site, mathematics achievement data were not available for this study.

Commonwealth of the Northern Mariana Islands

The Commonwealth of the Northern Mariana Islands Public School System provided data for this study through a systemwide data gathering and reporting system, the Pacific Educational Data Management System (PEDMS) database and the Commonwealth of the Northern Mariana Islands Public School System web site (Commonwealth of the Northern Mariana Islands Public School System, 2006). In the Northern Mariana Islands Public School System grade 8 students are assessed through the SAT–10 (Pacific Educational Data Management System, 2007).

Because of the lack of data and assurances of the data quality in some state education agencies, there are gaps in the summaries of findings on mathematics achievement in the region. More important, for state-developed assessments the technical properties (reliability and validity estimates and item statistics) of these assessments are not known.

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