A Critique of
"The Performance of Hawaii's Military Impacted
Public Schools: A Comparative Perspective"[1]

Following the collapse of the financial and housing bubbles in the fall of 2008 and the subsequent decline of state and local revenues, the state of Hawaii instituted 17 unpaid furlough days for teachers in Hawaii public schools during the 2009-10 school year to help balance the state's budget. This resulted in great public outcry, both from local residents and from the families of military-dependent children enrolled in public schools. Subsequently, the Department of Defense Education Activity (DoDEA), acting under provisions of 10 U.S.C. § 2164,[2] contracted with the University of Massachusetts Donahue Institute (hereafter UMass) to assess whether or not the state of Hawaii was providing "adequate and appropriate" educational programs in its public schools for dependents of military and civilian defense employees.

The UMass report[3] on Hawaii's public schools prepared by Goodman, et alia, produced a mixed set of results, reporting evidence of both excellence and problems in the public schools that serve military dependents. In the report itself, the authors did not reach a conclusion regarding the adequacy and appropriateness of Hawaii's public school programs, stating that such a conclusion was a "judgment call" best left to state and federal policymakers. Contradicting themselves, however, in their briefing presentation to the Hawaii Department of Education (HIDOE), the UMass researchers state, "There is no basis to establish DoDEA schools on military installations in Hawaii based on comparability with similar LEAs."[4]

There are some serious flaws in the UMass report's methodology that raise doubts about some of its findings, particularly those relating shortcomings of Hawaii's public schools. The purpose of this report is to bring those flaws to light and to correct errors of fact in the UMass report. These flaws include the methodology of the UMass "effectiveness index" and the method used to identify schools with performance problems, using data from the standardized TerraNova achievement test. The report's use of the "adequate yearly progress" (AYP) status of military impacted schools under the No Child Left Behind Act of 2002 (NCLB) without examination of the criteria for AYP is questionable, as are the report's comments about Hawaii's system of school finance, which reflect serious misunderstanding of both Hawaii's and California's fiscal situations and tax structures.

The Effectiveness Index

The UMass report purports to measure the effectiveness of schools using a method that is only sketchily outlined, even in what should be the report's technical appendix, and ascribes to that measure pinpoint accuracy that is

entirely unwarranted by its methodology. The UMass report's "effectiveness index" appears to be the difference between a school's actual percentage of students scoring proficient on the Hawaii State Assessment (HSA) and the percentage proficient predicted by a linear regression of school HSA scores on the percentage of their students receiving free or reduced cost lunch, a proxy measure for poverty in the school's community. The UMass report gave no more information about this index than stated above, so I analyzed the HSA data for 2008-09 (the year used by UMass) to attempt a replication of UMass' work. Such an index should be based on regressions that are strong, preferably accounting for more than 50% of the outcome variable's variance, as indicated by the adjusted R^2 produced by the regression procedure. Further, predicted values have a probable error, called the standard error of estimate, which should be used as an error band around values "predicted" by regression. (This was not done by the UMass researchers. Instead they took the predicted values as precise points, without error.)

In this replication, I calculated regressions separately for reading and mathematics percentages proficient for all Hawaii public schools in grades 3, 4, 5, 6, 7, 8, and 10, the grades tested on the HSA. The results are shown in Table 1.[5] The highest value of R^2 (43.1%), the proportion of variance explained by the regression, is quite modest. The accompanying standard

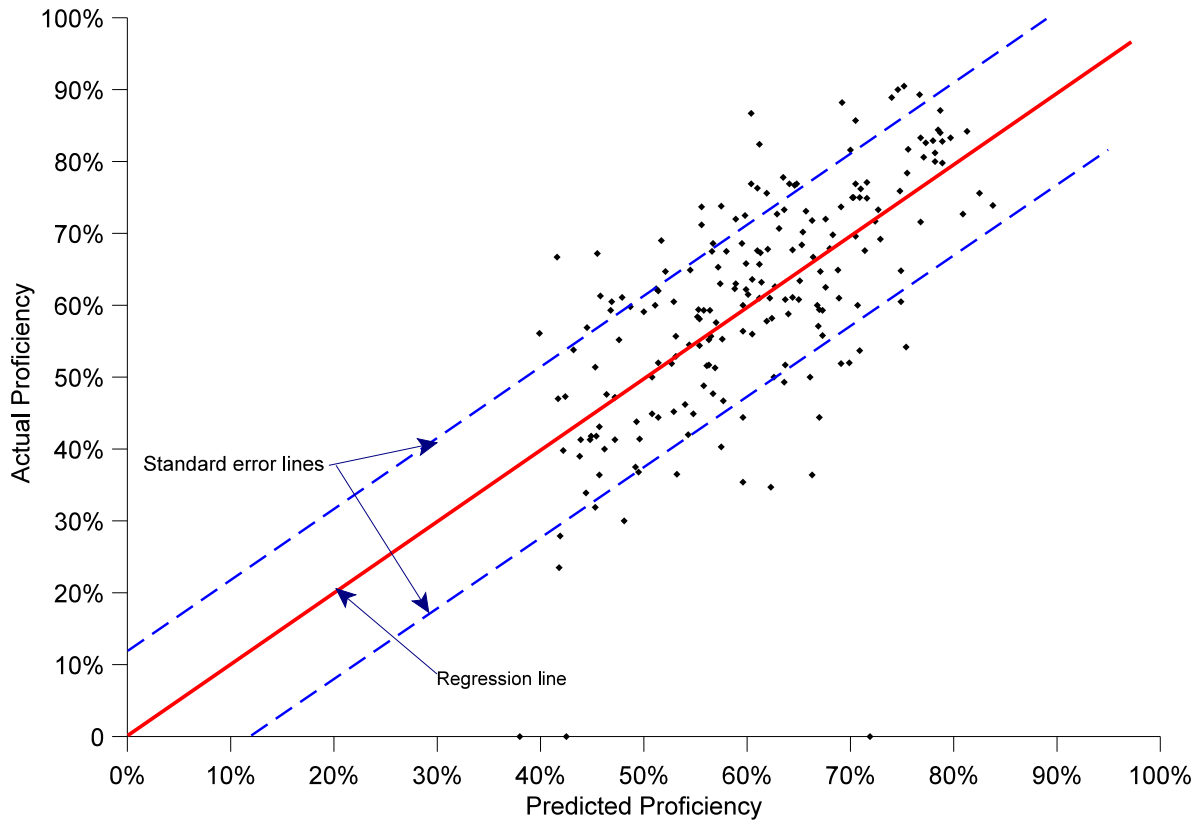
Table 1. Results of Regression of Percent Proficient on Percent Receiving Lunch Subsidies

	Reading			Mathematics		
Grade	R^2	S_e	Equation	R^2	S_e	Equation
3	32.7%	12.7%	Pr = 0.940 - 0.399xFl	23.1%	15.4%	Pm = 0.653 - 0.383 Fl
4	43.1%	12.1%	Pr = 0.838 - 0.476 Fl	30.3%	13.6%	Pm = 0.688 - 0.403 Fl
5	38.8%	13.9%	Pr = 0.842 - 0.497 Fl	22.0%	15.3%	Pm = 0.616 - 0.368 Fl
6	40.8%	16.0%	Pr = 0.912 - 0.601 Fl	27.6%	16.9%	Pm = 0.648 - 0.477 Fl
7	36.7%	16.5%	Pr = 0.894 - 0.584 Fl	31.8%	17.0%	Pm = 0.648 - 0.543 Fl
8	31.0%	15.1%	Pr = 0.871 - 0.475Fl	15.9%	15.3%	Pm = 0.470 - 0.319 Fl
10	25.4%	16.1%	Pr = 0.903 - 0.450 Fl	29.2%	14.1%	Pm = 0.449 - 0.430 Fl

R^2 = proportion of variance explained by the regression S_e = standard error of estimate
Pr = predicted reading percentage proficient Pm = predicted mathematics percentage proficient
Fl = percentage of students receiving free or reduced cost lunch

error of estimate (12.1%) means that about two-thirds of predicted scores fall within a 24% wide band around the regression line; this is far from a pinpoint prediction. To illustrate the meaning of these regressions, I graphed the strongest regression in the table, that of the 4th grade reading scores. This plot is shown in Figure 1, a graph of actual reading proficiency percentages plotted against the percentages predicted by regression on the percentage of students receiving free or reduced cost lunch. The regression line is shown in red, with dashed blue lines representing one standard error above or below the predicted values. In this type of analysis, the actual proficiency scores of schools that fall within one standard error of their

Figure 1. Actual and Predicted 4th Grade Reading Proficiency



predicted values are considered within the error of prediction. Only those scores that fall outside that range are considered better or worse than expected. This differs from the UMass treatment that treated regression estimates as exact predictions.

Two points are worth noting about Figure 1. First, the plot makes clear that this regression, the strongest of the 14, is not strong at all; the standard error of estimate is over 12%. Overall, the percentage of students receiving

free or reduced cost lunch is not a sufficient predictor of reading proficiency to be used by itself.[6] Second, while 18 of the 197 Hawaii public elementary schools, 4 of them military-impacted, scored below the expected range of scores, 32 schools, 5 of them military-impacted, scored above the predicted range. That would be a quite positive result if these regressions were strong enough to be used for school evaluation, but they are not. The UMass researchers' decision to dichotomize "proficiency" and "effectiveness" (pages 8-19)[7] makes big differences (e.g., efficient vs. inefficient) out of small differences between percentages. This goes well beyond the power of their data and the statistical methods they used.

The Use of TerraNova Scores

Along with the HSA, the Hawaii Department of Education has administered an abbreviated version of CTB/McGraw-Hill's TerraNova standardized test in grades 3 through 8 and grade 10. The purpose of using this test was to have a rough comparison of the achievement of Hawaii's public school students with that of students in the rest of the country. However, the TerraNova was not developed around Hawaii's curriculum standards, and it would not be appropriate to use it—let alone the highly abbreviated version of it used in Hawaii—to judge the effectiveness of individual schools.[8] Nonetheless, that is what the UMass researchers did (pages 29-32, 41-42).

Problems with TerraNova scores. Before reviewing the specific use that the UMass report made of TerraNova scores, there are questions about the TerraNova scores themselves that should be addressed. The HIDOE used a highly abbreviated version of the TerraNova because it is used only as a rough benchmark for comparing Hawaii students with a national sample. This version consisted of 30 to 35 reading items and 25 to 32 math items on each test. To examine the effect this brevity has on scores, I obtained students' TerraNova scores, both scaled scores and percentile ranks, from the 2008-09 test administration. The score distributions revealed two troubling facts.

First, although percentile ranks include all values from 1 through 99, the students' scores included only 21 to 29 values. This is a direct function of the test's brevity and results in large gaps between actual scores reported. For example, on the third grade TerraNova math test, scores in the middle range included only the 40th, 49th, 58th, and 68th percentiles.[9] These TerraNova scores have nowhere near the precision implied by reporting them as percentile ranks. They actually are only precise enough to justify stanine scores (a nine point scale based on the normal distribution), not percentile ranks.

Second, most of the data sets included test scores recorded as zeros. Zero is not a valid percentile rank; the lowest valid percentile rank is 1. The obvious explanation is that these zeros represent missing data—i.e., students who did not take that test. Therefore, these "scores" should not be included in any score tabulations, except as missing data, and definitely should not be included in calculations of means, medians, or variances.

UMass use of TerraNova scores. The UMass report does not indicate what summary measure was used in its comparisons of TerraNova scores; it simply shows a single percentile rank score for each entity. Given this and the limitations of the TerraNova scores, I calculated the median percentile rank on reading and math for grades 3, 5, 8, and 10 at each military-impacted school.[10] These values are shown in Tables 2 through 5.

What I found casts considerable doubt on the UMass report's use of the TerraNova scores. On the third grade reading test, the medians I calculated differed from the UMass school scores for 36 of the 40 military-impacted elementary schools, with an average difference of 6.4 percentile ranks. In all cases, the UMass school values were the lower ones. The UMass report does not state what summary value was used, but their data suggest that they used means instead of medians, included zero percentile ranks as valid scores, or both. On the third grade math test, the calculated medians differed from the UMass scores for 26 of the 40 schools, with one of the medians lower than the UMass score and the other 25 higher. The average difference was 6.2 percentile ranks.

Since its reported school scores are uninterpretable, the UMass report's comparisons of Hawaii public schools with Domestic Dependent Elementary and Secondary Schools and the Anchorage, Alaska, public schools are not valid. Likewise, the comparisons of military-impacted schools in Hawaii to the TerraNova national norms are invalid. The UMass researchers did not use accurate measures for Hawaii schools, and the report gives no indication what measure was used.

Tables 2 through 5 give the correct values for comparing Hawaii's military-impacted schools with the TerraNova norms, but with the caveat that the abbreviated tests used in Hawaii yield only a rough approximation of the scores students would have achieved on the full test.

Table 2. Third Grade TerraNova School Medians

School Code	School Name	Percent Military	Gr 3 Md Reading %ile	Gr 3 Md Math %ile
203	Aliamanu Elementary	71%	56	58
207	Hale Kula Elementary	98%	48	40
208	Helemano Elementary	33%	35	44.5
209	Horace Meek Hickam Elementary	86%	64	68
212	Kipapa Elementary	11%	48	49
215	Makalapa Elementary	24%	41	49
217	Moanalua Elementary	13%	56	58
220	Mokulele Elementary	13%	48	33
221	Chester W. Nimitz Elementary	19%	56	36.5
222	Pearl Harbor Elementary	12%	41	40
223	Pearl Harbor Kai Elementary	35%	41	49
225	Red Hill Elementary	98%	44.5	49
226	Samuel K. Solomon Elementary	55%	41	58
228	William R. Shafter Elementary	93%	64	49
229	Wahiawa Elementary	94%	38	40
234	Mililani Waena Elementary	10%	56	58
235	Gustave H. Webling Elementary	62%	48	68
236	Major Sheldon Wheeler Elementary	80%	64	58
240	Mililani Ike Elementary	14%	56	68
241	Mililani Mauka Elementary	24%	56	58
242	Mililani Uka Elementary	80%	56	58
243	Pearl Ridge Elementary	93%	60	68
251	Barbers Point Elementary	18%	56	40
253	Ewa Elementary	7%	41	40
256	Iroquois Point Elementary	16%	56	58
264	Palisades Elementary	10%	48	49
265	Pearl City Elementary	42%	48	58
268	Lehua Elementary	7%	41	49
280	Holomua Elementary	10%	41	58
282	Kapolei Elementary	11%	41	49
283	Kanoelani Elementary	35%	48	49
286	Mauka Lani Elementary	70%	26	33
287	Kaleiopuu Elementary	11%	35	44.5
290	Waikele Elementary	13%	41	49
294	Keoneula Elementary	12%	48	58
300	Aikahi Elementary	27%	79	77
308	Kailua Elementary	10%	48	58
311	Kainalu Elementary	13%	48	49
322	Mokapu Elementary	23%	56	58
330	Kaelepulu Elementary	96%	71	86

Table 3. Fifth Grade TerraNova School Medians

School Code	School Name	Percent Military	Gr 5 Md Reading Percentile	Gr 5 Md Math Percentile
203	Aliamanu Elementary	71%	48	63
207	Hale Kula Elementary	98%	54	54
208	Helemano Elementary	33%	38	49
209	Horace Meek Hickam Elementary	86%	70.5	71
212	Kipapa Elementary	11%	38	56
215	Makalapa Elementary	24%	70.5	67
217	Moanalua Elementary	13%	67	77
220	Mokulele Elementary	13%	67	49
221	Chester W. Nimitz Elementary	19%	61	63
222	Pearl Harbor Elementary	12%	40.5	41
223	Pearl Harbor Kai Elementary	35%	61	67
225	Red Hill Elementary	98%	43	52.5
226	Samuel K. Solomon Elementary	55%	48	44
228	William R. Shafter Elementary	93%	74	77
229	Wahiawa Elementary	94%	43	33
234	Mililani Waena Elementary	10%	54	56
235	Gustave H. Webling Elementary	62%	54	56
236	Major Sheldon Wheeler Elementary	80%	61	71
240	Mililani Ike Elementary	14%	67	77
241	Mililani Mauka Elementary	24%	67	71
242	Mililani Uka Elementary	80%	54	63
243	Pearl Ridge Elementary	93%	67	71
251	Barbers Point Elementary	18%	54	56
253	Ewa Elementary	7%	48	56
256	Iroquois Point Elementary	16%	48	56
264	Palisades Elementary	10%	54	71
265	Pearl City Elementary	42%	38	46.5
268	Lehua Elementary	7%	48	56
280	Holomua Elementary	10%	43	59.5
282	Kapolei Elementary	11%	43	56
283	Kanoelani Elementary	35%	48	63
286	Mauka Lani Elementary	70%	43	49
287	Kaleiopuu Elementary	11%	43	56
290	Waikele Elementary	13%	33	44
294	Keoneula Elementary	12%	54	49
300	Aikahi Elementary	27%	74	77
308	Kailua Elementary	10%	38	56
311	Kainalu Elementary	13%	61	56
322	Mokapu Elementary	23%	48	52.5
330	Kaelepulu Elementary	96%	57.5	63

Table 4. Eighth Grade TerraNova School Medians

School Code	School Name	Percent Military	Gr 8 Md Reading Percentile	Gr 8 Md Math Percentile
204	Aliamanu Middle	64%	56	59
219	Moanalua Middle	8%	66	59
237	Major Sheldon Wheeler Middle	93%	60	54
238	Mililani Middle	100%	70	64
255	Highlands Intermediate	8%	56	59
279	Ilima Intermediate	11%	51	43
291	Kapolei Middle	28%	51	48
310	Kailua Intermediate	18%	66	70

Table 5. Tenth Grade TerraNova School Medians

School Code	School Name	Percent Military	Gr 10 Md Reading Percentile	Gr 10 Md Math Percentile
202	Aiea High	5%	47	50
214	Leilehua High	32%	47	56
216	Mililani High	13%	60	67
218	Moanalua High	14%	56	62
224	Admiral Arthur W. Radford High	96%	51	56
252	James Campbell High	6%	47	56
266	Pearl City High	12%	51	56
292	Kapolei High	7%	47	50
312	Kalaheo High	20%	51	62

Finally, to get a more accurate view of the performance of Hawaii's military dependent students in comparison to those elsewhere, I constructed histograms of the stanine scores of military dependent students in military-impacted schools. The use of stanines instead of percentile ranks accommodates the coarseness of the scores from the abbreviated test. In doing so, I used the individual student scores on the TerraNova mentioned above, focusing on the military dependent students and omitting the scores of zero (missing data). These histograms are shown for grades 3, 5, 8, and 10 in Figures 1 through 4 (following pages). In interpreting these graphs, the bars for an average sample would match the bars of the TerraNova norms. Higher performance would be indicated by shorter bars than the norms on the left side of the graph (stanines 1 through 4) and higher bars than the norms on the right side of the graph (stanines 6 through 9).

What these graphs indicate is that if there is any difference between military dependents' performance and the TerraNova norms, it is a somewhat higher performance by Hawaii's military dependents. This is weakest in the third grade and strongest in the fifth grade, but it is present in all four grades.

Figure 2. TerraNova Performance of 3rd Grade Military Dependents

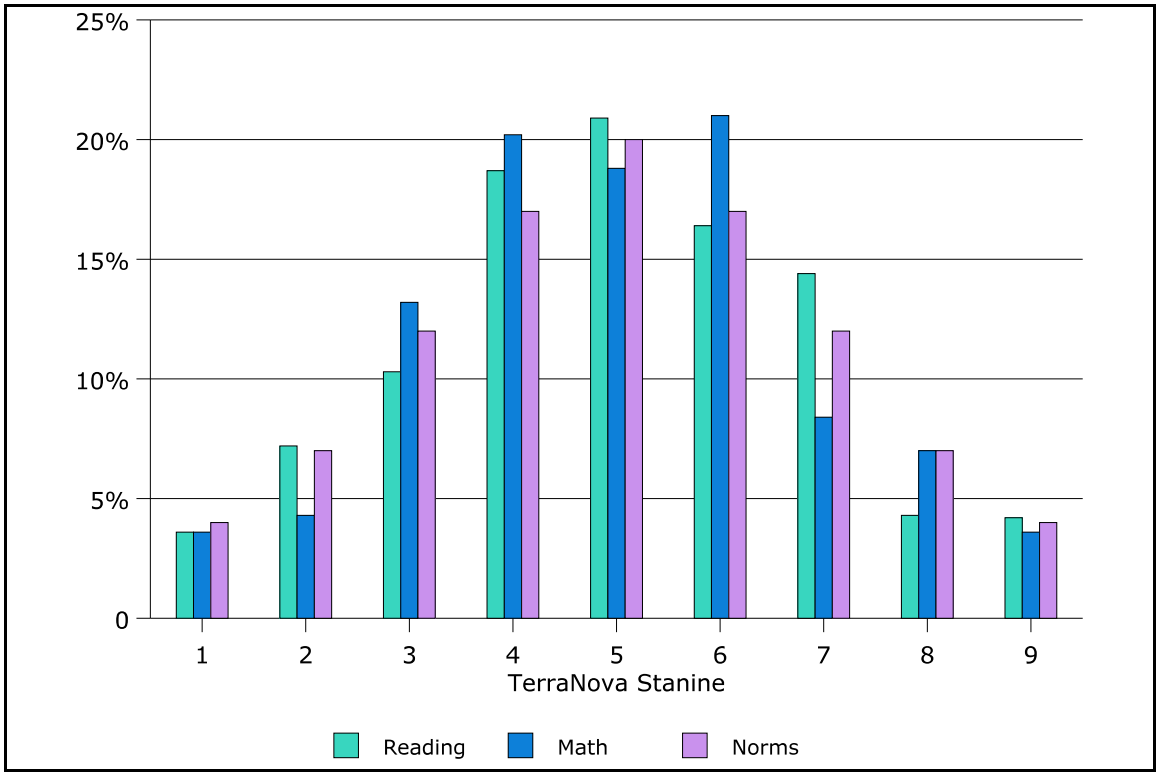


Figure 3. TerraNova Performance of 5th Grade Military Dependents

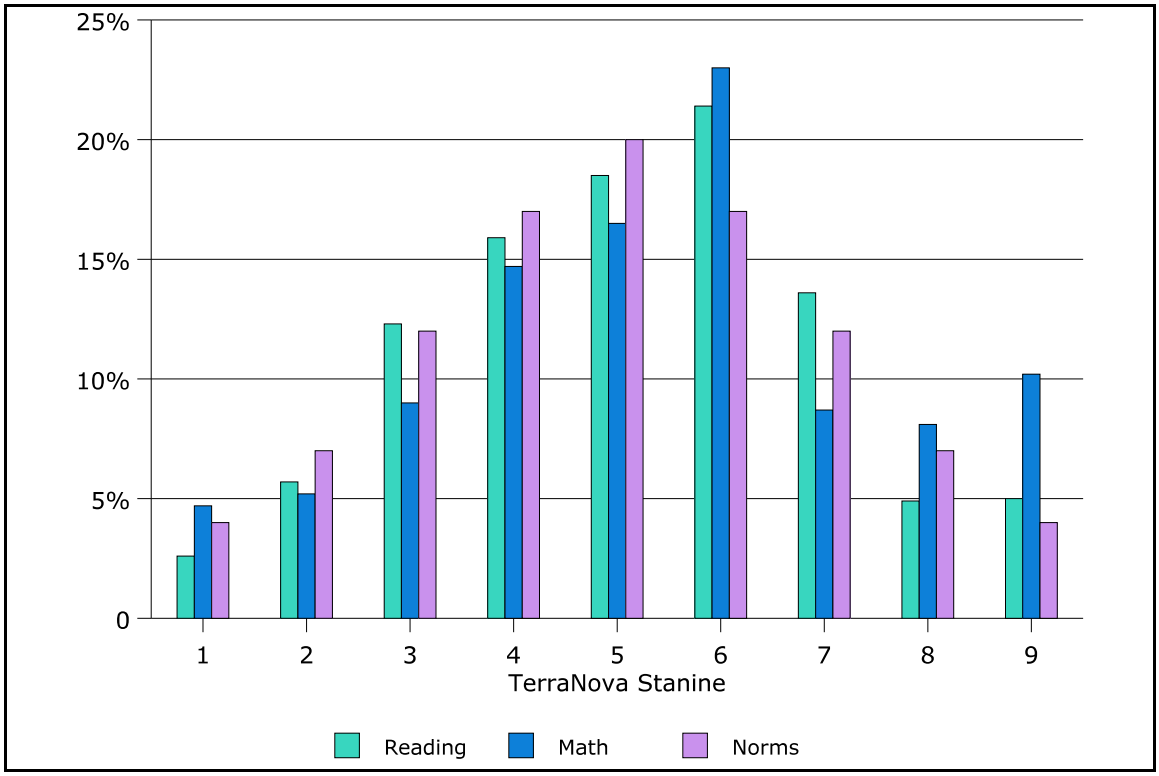


Figure 4. TerraNova Performance of 8th Grade Military Dependents

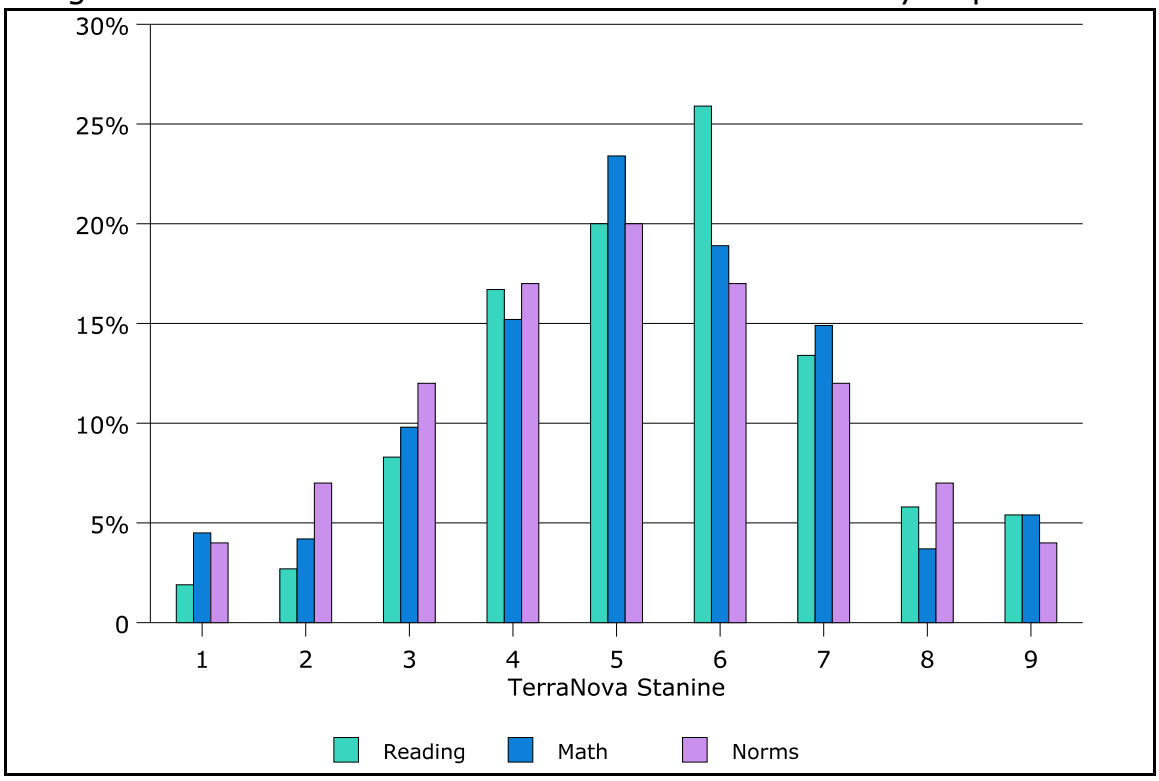
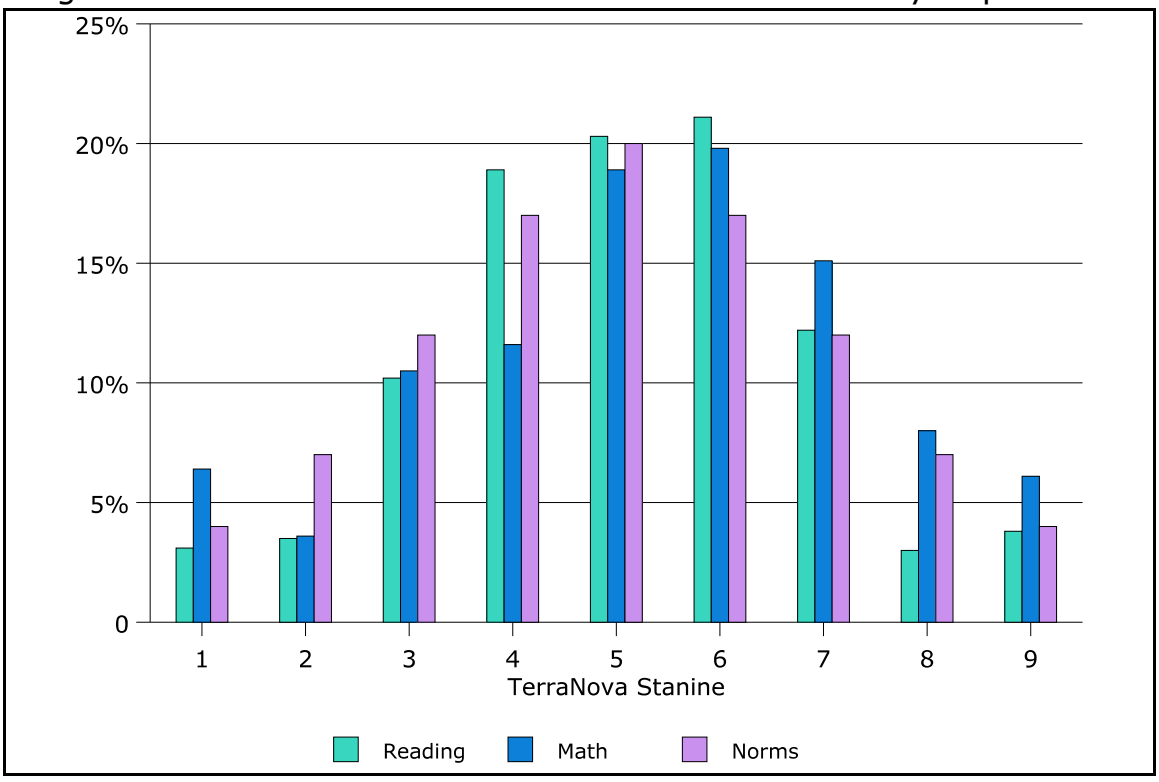


Figure 5. TerraNova Performance of 10th Grade Military Dependents



The Use of "AYP"

In the 2002 re-enactment of the Elementary and Secondary Education Act, now commonly called NCLB (for "No Child Left Behind"), Congress created a standard called "adequate yearly progress" or AYP. The term was borrowed from a previous version of the law, where it referred to a standard of pupils' progress in the program serving poor children (Title I). Under NCLB, AYP was transformed into a mandated measure of schools' progress toward perfection. Instead of requiring schools to measure how groups of students showed progress from year to year, NCLB required AYP to measure the progress of different cohorts of students in the same grade in succeeding years toward the goal of having ***all students*** (100%) in ***all grades*** meet the state's standards of proficiency in reading and mathematics by the end of school year 2013-14. This was to be measured by standardized tests administered statewide to students in grades 3 through 8 and one grade in high school.[11] Schools that failed to "make AYP" were to be subjected to progressive sanctions, culminating in "restructuring." This requirement for all schools to reach virtual perfection by 2013-14 is widely recognized to produce the eventual result of virtually all public schools being labeled as "failing," even by conservative educators like Diane Ravitch.[12]

Besides the inevitability of ultimate failure to "make AYP," there are a number of problems with using schools' current NCLB standing or AYP status for comparisons among districts in different states. First, under NCLB each state created its own standards of proficiency. This reflects the fact that education is not a federal function under the Constitution, and each state sets the curriculum to be followed in its schools. This makes comparisons across states impossible: each state's curriculum is different, its standards of achievement are different, and the tests it uses to measure achievement are different. The only similarities are in the language of the mandated NCLB reports: "AYP met," "AYP not met," "school in need of improvement," etc.

School Performance Issues

The UMass report identifies 30 of the 57 military-impacted schools as having "performance issues," defined as having failed to meet state standards in reading or math for two years and having TerraNova reading or math scores below the 50th percentile (pages 39-40). Of these schools, 22 are elementary schools, 2 are middle or intermediate schools, and 6 are high schools. As noted above, the figures UMass used for school percentile ranks are unusable, and thus the list of "troubled" schools is questionable.[13]

First, each of the 22 identified elementary schools has four TerraNova scores (reading and math in grades 3 and 5). Of these 88 scores, 33 of the school medians are at or above the 50th percentile rank (Tables 2 and 3). Two of the schools, Kaelepulu and Mililani Uka, have ***all four*** of their median scores above 50, and Barbers Point has three medians above 50. The median

reading percentile rank for both intermediate schools and two of the high schools is 51, and all six high schools have math median percentile ranks at or above 50. Two high schools, Pearl City and Radford, had both reading and math medians above 50. Clearly, something is amiss with the UMass report's identification of "performance issues," and it is the value used as the school's "score" on the TerraNova.

State and Local Education Funding

The UMass report notes that funding for K-12 education is under threat around the country because of declining tax revenues. That is true, but the report goes on to state, "In fact, the manner in which Hawaii organizes its public education system may make it more vulnerable than other states to the recent volatility in state finances." That statement is highly questionable, particularly in view of the fact that two of its comparison districts are in California, where both state and local finances are among the most troubled in the nation. Hawaii's school funding, as the report noted, comes predominately from the state general fund. That fund depends on two primary tax sources, a state income tax and a statewide general excise tax. The latter is a particularly robust source of revenue; it is levied on the gross amount of every transaction (wholesale, retail, service fee, or whatever) that takes place in the state. This tax "exports" about a third of its impact to tourists, who come in large numbers from Asian nations not severely affected by the 2007 recession. Both income and excise taxes are fully under the control of the legislature and governor without constitutional restrictions.

By contrast, in California school funding comes from the state, which is in multi-billion dollar deficit, and local property taxes. Contrary to the UMass researchers' belief, local school districts in California cannot raise local property tax rates if they are already at the 10 mil limit (1% of assessed value) established by Proposition 13 in 1978.[14] Moreover, assessed values can be (and have been) lowered with the market, but they cannot be raised by more than the rate of inflation or 2%, whichever is lower, unless the property has been sold. Further, it requires a two-thirds majority in both houses of the legislature to pass a state budget, let alone to raise taxes. These provisions have been major impediments to California's dealing with its fiscal problems and adequately funding vital public services, including education.

The data in the UMass report itself (page 44) contradict the report's assertion of Hawaii's funding vulnerability. Hawaii's 2008 per pupil expenditures are more than $1,000 higher than all comparison districts except Anchorage and the DDESS schools. Alaska's situation is unique among the states. Its costs for almost all things are substantially higher, and it benefits from very substantial state revenue from oil severance taxes on the output of the Alaska pipeline (enough to give every state resident an annual subsidy of

$1,000 or more). The DDESS schools receive their funding via the federal defense budget, and their funding places their per pupil expenditures on par with the five richest states.[15] Given the extraordinary funding sources of Alaska and DDESS schools, Hawaii funds its schools very well in comparison to the West Coast states.

Finally, the UMass report fails to note that Hawaii has the most equitable distribution of school funding in the nation because its funding is independent of local property value. Funds are allocated to schools by formula, based on the number, level, and special needs of the students enrolled. No other state has that level of equity. Most have wide disparities between the funding available to property-rich communities and that available to areas of low wealth and property value.

Conclusions

From the data reviewed above, the conclusion reached by the UMass researchers, that there "is no basis to establish DoDEA schools on military installations in Hawaii based on comparability with similar LEAs," is clearly supported. Military dependent students in Hawaii perform at or above the national norms for the TerraNova achievement test. Hawaii supports its public schools more substantially than do "comparable" districts in California and Washington, albeit somewhat less well than the federal government does its Department of Defense schools. As noted in the UMass report, Hawaii has received a $75 million federal grant for improvement under the "Race to the Top" program. It has adopted the Common Core State Standards curriculum along with 43 other states, and it has joined with 38 other states in the Interstate Compact on Educational Opportunity for Military Children. All these facts support the judgment that Hawaii is committed to providing adequate and appropriate educational programs for all its students, military dependents expressly included.

TGG/10-28-2011

Notes

1. This critique was prepared by Thomas Gans, PhD, at the request of the Department of Education. Dr. Gans earned BS, MA and PhD degrees from Stanford University in physical sciences and education. He served as an administrator at Cleveland State University and the University of Wisconsin-Oshkosh. Later he served as negotiations project co-ordinator for the Wisconsin Association of School Boards, where he developed databases to support collective bargaining with teachers and school staff. After moving to Hawaii, he served as an evaluation specialist for the Hawaii Department of Education, where he helped develop and produce the annual School Status and Improvement Reports for all 250+ public schools and prepared the annual Superintendent's Report on School Performance and Improvement in Hawaii from 1991 through 2004. He retired from the department in 2003.

2. The statute says in part: "If the Secretary of Defense makes a determination that appropriate educational programs are not available through a local educational agency for dependents of members of the armed forces and dependents of civilian employees of the Federal Government residing on a military installation in the United States (including territories, commonwealths, and possessions of the United States), the Secretary may enter into arrangements to provide for the elementary or secondary education of the dependents of such members of the armed forces and, to the extent authorized in subsection c, the dependents of such civilian employees."

3. Goodman, M, et al. (2010a). *The performance of Hawaii's military impacted public schools: A comparative perspective.* Dartmouth: University of Massachusetts Donahue Institute.

4. Goodman, M, et al. (2010b). *The performance of Hawaii's military impacted public schools: A comparative perspective* report, presentation to the Hawaii State Department of Education (PowerPoint slide presentation).

5. The full output of the regression procedures can be found at the following URL:
http://www.hawaii.edu/hera/TerraNova_Regressions.pdf

6. In the early 1990s, the Hawaii Department of Education investigated the use of regression to evaluate school performance on standardized tests. The results were promising, but the procedure was not adopted. It was obviated by the federal adoption of NCLB. In that study, regressions of school mean scaled scores on the Stanford Achievement Test on a variety of demographic data, including lunch subsidy data, explained between 46% and 76% of test score variance. For further information, see

> Gans, T. G. *The stability of regression based school performance indices*. Paper presented at the annual meeting of the Hawaii Educational Research Association, Honolulu, Hawaii, February, 1995. Available at http://www.hawaii.edu/hera/1995_School_Performance_Indices_Paper.pdf

For an explanation of the principles underlying regression based accountability procedures, see

> Dyer, H. S. (1970). Toward objective criteria of professional accountability in the schools of New York City. *Phi Delta Kappan*, *52*, 206-211.

7. These are their terms for the difference between predicted and actual percentage proficient (proficiency) and the difference between percentage proficient and the state

standard under NCLB (efficiency).

8. Because of this, and its cost, use of the TerraNova has been dropped by the Hawaii schools after the 2010-11 school year.

9. The effect of the test abbreviation is obvious in the frequency distributions of percentile rank scores for Hawaii. These frequencies are shown in the following file:
http://www.hawaii.edu/hera/TerraNova_Distributions.pdf
A quick glance of the tables reveals that most possible percentile rank scores have no occurrences in the Hawaii scores. For example, actual scores for third graders skip from 30 to 35 to 41 to 48, etc. For the full length test, a population the size of Hawaii would have counts for all possible percentile rank values.

10. Percentile rank is an ordinal measure; it accurately indicates order, but the intervals on the scale can differ in magnitude. The appropriate summary value for an ordinal scale is the median. Using the mean requires an interval scale, one on which the intervals between points on the scale are equal throughout.

11. For Hawaii schools, there are 37 separate checkpoints on the way to "making AYP." Making AYP requires 9 groups (7 ethnicities, the economically disadvantaged, and students with disabilities) each to have at least 95% of their members take each of the state proficiency tests (reading and mathematics) ***and*** achieve the percentage passing rate required by the state's NCLB plan. That percentage becomes 100% in the 2013-14 school year. That makes 36 pass/fail tests, the failure of any one of which results in overall school "failure to make AYP." The 37th AYP criterion is overall retention rate for elementary, intermediate, and middle schools and overall graduation rate for high schools.

12. Ravitch, D. (2010). *The death and life of the great American school system: How testing and choice are undermining education*. New York: Basic Books.

13. The UMass researchers also misidentified Barbers Point Elementary School as an on-base school. It is not; Barbers Point Naval Air Station was closed in 1998 and the installation ceded to the state of Hawaii. The school is military-impacted, but it also draws heavily from the local communities.

14. Ten mils ($1 per $100 assessed value) is comparable to the lowest municipal property tax rates in the country. See U.S. Census Bureau, *Statistical abstract of the United States: 2012*, online: http://www.census.gov/compendia/statab/2012edition.html, Table 517, p. 324.

15. Snyder, T.D., & Dillow, S.A. (2011). *Digest of education statistics 2010* (NCES 2011-015). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Table 193, pp. 277-78.