

Addendum to
An Initial Evaluation of the Iowa DE Project to Enhance Students' Authentic Intellectual Work, Fall 2007 to Fall 2011.
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The initial evaluation found consistently higher student achievement in AIW schools compared with matched control schools across grade levels in reading, math, science and social studies. We qualified these findings by noting the possibility that the differences could be explained by selection bias rather than the professional development offered by the AIW program. It is possible that teachers in the schools that volunteered to participate in the AIW program were more highly motivated to devote serious effort to their students' achievement than teachers in non-AIW schools - before they had any experience with AIW professional development. This selection bias could explain higher achievement in AIW schools, independent of participation in the AIW program. Following publication of the initial evaluation, we tested this explanation by examining achievement trends in AIW and matched non-AIW schools prior to the AIW schools' participation in the AIW program.

Since the program began in fall 2007, we examined achievement data in the same AIW and control schools for three prior years: 2004-05, 2005-06, and 2006-07. Iowa has comparable test data for those years in reading and mathematics on the Iowa Test of Basic Skills, grades 4 and 8, and on the Iowa Test of Educational Development in grade 11. As in 2010-2011, tests were administered in fall, winter, and spring. Because fall and winter scores tend to be lower than spring scores, the fall and winter scores were statistically adjusted to a single scale. To determine statistical significance of mean differences (i.e. probability that observed differences were due to chance), non-paired T-Test was applied by comparing mean scores of AIW-Non AIW schools, within the same year and the same grade.

Table 1 shows the extent of achievement differences between AIW and non-AIW schools for the three years prior to program entry and for 2010-2011. In the 3 years prior to program implementation, grade level achievement in AIW schools was **equivalent** to non-AIW schools' achievement in 15 of the 18 comparisons (3 years x 3 grades x 2 subjects). In one of the three instances in which statistically significant differences occurred prior to the onset of the program, the AIW schools scored substantially lower (Reading, 2005-06, grade 4). In the other two instances, AIW schools scored higher (Mathematics, grade 11, 2005-06 and 2006-07).

In contrast, in 2010-2011, after the program had been in effect, AIW achievement **exceeded** non-AIW achievement in five of the six comparisons (1 year x 3 grades x 2 subjects). Reading in the 11th grade was the one comparison for this year that did not favor AIW students at a statistically significant level. Compared to reading, mathematics showed far greater achievement advantages for AIW students.

Overall, the data indicate that prior to program entry the AIW and control schools did not differ substantially on student achievement in reading and mathematics which supports the conclusion that AIW's higher achievement after program entry was probably not due to selection bias. If selection bias does not explain the 2010-2011 achievement differences, a stronger case can be made that the differences were due to the AIW program of professional development.

¹ This report was written by Fred M. Newmann, with support and assistance from Rita Martens, Mary Delagardelle, Xiaoping Wang, and Xia Chen of the Iowa Department of Education, and Bruce King, and Dana Carmichael of the Center for Authentic Intellectual Work.

**Table 1: Achievement Differences Between AIW and Non-AIW Schools:
Comparisons Between 3 Years Prior to Program and Year 4 of Program**

year	grade	Reading			Mathematics		
		AIW-Non-AIW Mean Difference	P value*	AIW percentile advantage**	AIW-Non-AIW Mean Difference	P value*	AIW percentile advantage**
2004-05	4	0.5	0.890	.6	2.8	0.320	3.4
	8	1.8	0.450	1.8	1.9	0.370	2.1
	11	0.6	0.810	.5	6.8	0.320	5.6
2005-06	4	-10.7	0.002	-11.7	1.1	0.684	1.6
	8	0.2	0.913	.8	1.1	0.593	1.1
	11	3.9	0.066	3.3	3.8	0.053	3.3
2006-07	4	-3.1	0.310	-4.1	-1.5	0.583	-2.4
	8	-0.7	0.771	-.6	1.1	0.612	1.2
	11	3.4	0.144	2.9	6.4	0.000	5.7
After AIW implementation							
2010-11	4	7.1	0.030	9.1	7.5	0.006	11.4
	8	5.7	0.014	5.5	7.6	0.001	8.1
	11	3.6	0.080	2.9	12.1	0.001	11.2

* Probability that observed difference in means is due to chance, rather than program. When probability due to chance is .05 or lower, the observed difference is considered “ statistically significant,” or not due to chance. Mean differences that were statistically significant at the .05 level are highlighted.

** Percentile advantage was calculated by taking the difference between means and dividing it by the standard deviation (of the AIW scores) which is a measure of the amount that student scores are spread out on either side of the mean in the total distribution of student scores. In a normal distribution, which we assume here, about 34% of the scores are below the mean and 34% above the mean (that is, one standard deviation in each direction). A student scoring one standard deviation above the mean would be in the 84th percentile of the total distribution of students. So, for example, if on a test the AIW mean exceeds the non-AIW mean by 5 points and the standard deviation in that group of scores is 20, that difference represents 25% of a standard deviation. The average AIW student would score 25% of a standard deviation higher than the average non-AIW student. Since 25% of 34 percentiles is 8.5 percentiles, the average AIW student would have an achievement advantage of 8.5 percentiles over the non AIW student. Percentile advantages that were statistically significant at the .05 level are highlighted.