Comparison of *Annual Growth Percentiles* Among Alternative Education and Traditional *Middle School Students* in Arizona

Jody L. Ernst, Ph.D.
Director of Research & Evaluation
Colorado League of Charter Schools

COLORADO LEAGUE *of* CHARTER SCHOOLS

focus on achievement

This work was supported by a US Department of Education National Leadership Grant (Grant #No. U282N060030); Building Charter School Quality, an initiative to support the use of data in charter schools, and by all stakeholder group, when making decisions about what makes for quality charter schools in our nation. I would like to extend thanks the Colorado Department of Education for supplying the data necessary to conduct this important research and to Damian Betebenner, at the Center for Assessment, for his invaluable work on student longitudinal growth and his professional advice on this work.

In this era of high stakes accountability, aggregate results on state standardized tests are the measures by which schools live or die. While we do not refute that schools need to be held accountable for helping students achieve, we do argue that not all schools should be held to the same definition of "achievement". Specifically, there is a group of schools (approximately 119 in Arizona) that cater to the state's most difficult students—those that have previously dropped out or are at risk of doing so. These alternative education campuses[1] (or AECs) accept, as their mission, students who walk through their

doors years behind in mathematics and reading skills. In addition, many students attending AECs struggle with behavioral, emotional, and/or substance abuse problems, while others have children or other family members to care of and provide for. Education for these students often takes a back seat, whether by choice or necessity.

With these academic and psychosocial challenges, students attending AECs tend to pass the state tests (i.e., AIMS) at a far lower rate than students attending traditional schools. Tables 1 and 2 show the relative percent of students that passed the AIMS tests in Mathematics (Table 1) and Reading (Table 2), as a function of the type of school the students were enrolled in, alternative (AEC) or traditional (Non-AEC) education campuses.

Table 1. Percent of Middle School Students to Pass the AIMS Mathematics Test in 2006-2008, by School Type

	PERCENT TO PASS IN 2006		PERCENT TO PASS IN 2007		PERCENT TO PASS IN 2008	
GRADE	AEC	NON-AEC	AEC	NON-AEC	AEC	NON-AEC
6TH	7%	34%	5%	36%	4%	40%
7TH	10%	50%	9%	53%	17%	56%
8TH	15%	59%	8%	48%	16%	61%

When looking at the mathematics portion of the AIMS test over the last three years of testing, fewer than 8 percent of AEC 6th grade students passed (Table 1), compared to 34-40 percent of traditional 6th grade students. While the percentage of students to pass increase slightly with AEC students in 7th and 8th grades, they do so for students attending non-AECs as well. With few exceptions, the percentage of students attending AECs in 6th-8th grade that pass the AIMS mathematics test is at least 30 percentage points below the pass rate of non-AEC middle school students.

While the pass rates are a bit higher for the AIMS reading tests (Table 2), the differences (in percentage points) between AEC and Non-AEC students are at least as great as those for mathematics, across all three years.

Table 2. Percent of Middle School Students to Pass the AIMS Reading Test in 2006-2008, by School Type

	PERCENT TO PASS IN 2006		PERCENT TO PASS IN 2007		PERCENT TO PASS IN 2008	
GRADE	AEC	NON-AEC	AEC	NON-AEC	AEC	NON-AEC
6TH	13%	45%	12%	50%	15%	52%
7TH	20%	57%	20%	60%	21%	60%
8TH	23%	63%	24%	62%	24%	63%

Proficiency based accountability models essentially "blame" these low pass rates on the schools. However, snap-shot data (data viewed at one point in time, such as percent of student scoring proficient or better) captures only the scores of those who were sitting in the seats on the day of the test, without consideration of each student's prior academic history. Using snap-shot data as an accountability measure has long been questioned by researchers, assessment professionals, and educators alike (Linn, 2001, 2003; Linn, Baker & Betebenner 2002).

Instead, measures of student longitudinal growth have been suggested as better means of assessing school effectiveness (Linn, 2001; Rubin, Stuart, & Zanutto, 2004; Singer & Willett, 2003).

1 Alternative education is defined as "schools or programs that serve students who are not succeeding in the regular school environment, such as students who are at risk of dropping out, students who have been expelled from their regular classes or students who are undergoing outpatient treatment for drug use, etc. Citation from Arizona Department of Education, 2007 Safe and Drug-Free Schools Report: Terms and Definitions (available at http://azed.gov/sa/health/matrix/TermsDefinitions06-07.pdf).

Tracking student longitudinal growth is often better for making judgments about how well a school is helping students to obtain their goals, while also informing instruction and goal setting.

The state of Arizona has adopted a longitudinal growth model as part of its accountability framework, a regression technique that projects expected gains based on students' prior year scale scores. However, the state does not include this longitudinal measure in its evaluation of school performance for alternative education campuses—citing the diversity of alternative programs and the mobility of the alternative education student population as problematic to finding reliable school growth parameters[2]. Therefore, Arizona AECs receive performance ratings (limited to performing and underperforming only) based on AIMS scale score points alone (at the elementary and middle school levels).

The growth percentile methodology (Betebenner, 2008) is a newer method of calculating growth based on the establishment of growth norms utilizing the entire state data set. Using quantile regression, this method produces a conditional distribution for each student based upon their AIMS scale score history and assigns a growth percentile to the individual's current year score based upon that distribution. Median, or typical, growth for the state of Arizona is located at the 50th percentile in all subject areas. Therefore, students (or groups of students) that display median growth percentiles around the 50th percentile can be said to have grown at what is considered to be the "typical" rate. Qualifying growth as "good/adequate" or "bad/inadequate" is a standard setting procedure requiring external criteria and expert judgment to establish these criteria.

The nature of the growth percentile methodology is a promising model for exploring the growth of AEC students and comparing their growth results to students in the same grades attending traditional public schools. The model uses data from students across the state and compares all students with the same grade and prior year scale score. While schools' median growth has been found to be associated with school size (smaller school size makes it easier to have median percentiles at either extreme) (Betebenner, unpublished), individual student growth calculations are not influenced by these methodological limitations.

A list of alternative education campuses from 2005 to 2008 was obtained from the Arizona Department of Education. This data was then matched to the statewide student level AIMS scale scores and corresponding school identification numbers for all students in Arizona. Growth percentiles were then computed for all students that had at least two valid scale scores in mathematics and/or reading for the following years: 2005-06 to 2006-07 and 2006-07 to 2007-08.

WHAT PERCENTAGE OF MIDDLE SCHOOL STUDENTS ATTEND ALTERNATIVE EDUCATION CAMPUSES IN ARIZONA?

Before delving into the growth comparisons, the percentage of Arizona's middle school students that attend AECs was explored. Tables 3 and 4 report the number of students that attended an AEC for 0, 1, 2, or 3 years (between 2006 and 2008). Table 3 reports on students that were in 6th, 7th, and 8th grade during the 2006-07 academic year, while Table 4 reports on students during the 2007-08 academic year. Both tables show similar results. In each middle school grade, less than one percent of students attended an AEC. However, the percentage of students attending an AEC increased slightly as the grade levels increase. For example, in 2007 the percentage of students that attended an AEC for one year, between 2005-06 and 2006-07, increased from 0.2 percent of all students in 6th grade to 0.5 percent of all students in 8th grade.

Table 3. Number (and Percent) of Students that Attended an AEC for 0, 1, or 2 Years between 2006 and 2007

	2007 GRADE		
# OF YEARS ATTENDED AN AEC	6TH NUMBER (%)	7TH NUMBER (%)	8TH NUMBER (%)
0	72,039 (97.8)	71,684 (97.8)	71,041 (98.0)
1	180 (0.2)	287 (0.4)	391 (0.5)
2	84 (0.1)	103 (0.1)	115 (0.2)

NOTE: Percentages do not add up to 100 due to rounding and students with missing school identification data.

Table 4. Number (and Percent) of Students that Attended an AEC for 0, 1, 2, or 3 Years between 2006 and 2008

	2008 GRADE		
# OF YEARS ATTENDED AN AEC	6TH NUMBER (%)	7TH NUMBER (%)	8TH NUMBER (%)
0	66,431 (88.1)	65,526 (88.7)	65,428 (88.5)
1	157 (0.2)	219 (0.3)	355 (0.5)
2	41 (0.1)	87 (0.1)	103 (0.1)
3	27 (<0.1)	28 (<0.1)	41 (0.1)

NOTE: Percentages do not add up to 100 due to rounding and students with missing school identification data.

2 AIMS 2007 Technical Manual.

Many case studies and research reports suggest that students that enroll in alternative education schools tend to be highly mobile (e.g., Kennelly & Monrad, 2007), consequently, the finding that a majority of AEC students were only enrolled for one year was not surprising. Additionally, the mission of many AECs is to transition students back into mainstream schools, once they have helped them adjust to their situation (e.g., find a home, receive treatment for a substance problem, acquire professional assistance, etc).

DOES THE TYPICAL GROWTH AMONG ALTERNATIVE EDUCATION STUDENTS DIFFER FROM THAT OF TRADITIONAL MIDDLE SCHOOL STUDENTS?

To investigate whether students attending AECs, during their middle school years, attain the same median growth as students attending traditional public middle schools, growth percentiles for the entire state were calculated. Median growth was then compared among students that attended AECs and students attending traditional public schools in Arizona.

Table 5. Median Growth Percentiles in Mathematics for AEC and Non-AEC Students in Grades Six through Eight (2007)

GRADE	AEC STUDENTS		NON-AEC STUDENTS	
	MEDIAN GPA	# OF STUDENTS	MEDIAN GPA	# OF STUDENTS
6TH	35	200	50	72,207
7TH	30	295	50	71,889
8TH	31	410	50	71,316

A. GP stands for growth percentile

Table 6. Median Growth Percentiles in Reading for AEC and Non-AEC Students in Grades Six through Eight (2007)

GRADE	AEC STUDENTS		NON-AEC STUDENTS	
	MEDIAN GPA	# OF STUDENTS	MEDIAN GPA	# OF STUDENTS
6TH	38	200	49	73,492
7TH	33	295	49	73,091
8TH	34	411	49	72,079

A. GP stands for growth percentile

Tables 5 and 6 display the median student growth percentiles, in mathematics (Table 5) and reading (Table 6), among 6th, 7th, and 8th grade students that attended either an AEC or traditional middle school, during the 2006 and 2007 academic year. Median growth percentiles among non-AEC students fell in the typical range in both subject areas—around the 50th percentile. However, for middle school students attending AECs, median growth percentiles in both mathematics (ranging between the 30th and 35th percentile) and reading (ranging between the 33rd and 38th percentile) were substantially lower in all three grade levels. In addition, the difference between the median growth percentiles appears to get larger as students' grade levels increase. In other words, while the median growth of traditional middle school students remained consistent across 6th, 7th, and 8th grade; the growth percentiles of AEC students appear to be lower for 7th and 8th graders than 6th graders.

Table 7. Median Growth Percentiles in Mathematics for AEC and Non-AEC Students in Grades Six through Eight (2008)

GRADE	AEC STUDENTS		NON-AEC STUDENTS	
	MEDIAN GPA	# OF STUDENTS	MEDIAN GPA	# OF STUDENTS
6TH	49	165	50	71,991
7TH	32	252	50	71,072
8TH	32	401	50	71,267

A. GP stands for growth percentile

Table 8. Median Growth Percentiles in Reading for AEC and Non-AEC Students in Grades Six through Eight (2008)

GRADE	AEC STUDENTS		NON-AEC STUDENTS	
	MEDIAN GPA	# OF STUDENTS	MEDIAN GPA	# OF STUDENTS
6TH	41	167	50	75,261
7TH	34	251	50	73,655
8TH	32	408	50	73,559

A. GP stands for growth percentile

Tables 7 and 8 show the median growth percentiles, for AEC and non-AEC students in 6th, 7th, and 8th grade, between 2007 and 2008. The results are very similar to those for the 2006 to 2007 median growth comparison. In each grade level, and in both subject areas, AEC students had lower median growth percentiles than their non-AEC counterparts. Also, the same pattern emerged showing larger differences between median growth percentiles in the higher grade levels.

Results from these comparisons suggest that students attending AEC middle schools in Arizona grow more slowly than traditional middle school students in both mathematics and reading. In addition, older students appear to grow more slowly than younger students—a pattern not reflected in the traditional middle school students' growth.

IS LENGTH OF AEC ENROLLMENT RELATED TO ANNUAL GROWTH?

The previous analysis compiles all students that attended an alternative campus during the year that growth was assessed. The following analyses were conducted to answer the question of whether the length of time students attend an alternative campus is related to students' annual growth.

The length of time a student attends an alternative school may be seen as a proxy for the severity of a student's educational and/or psychosocial difficulties. On the other hand, students may choose to remain enrolled in an alternative school because the program and staff are meeting their needs and making learning easier and more enjoyable for the student than it was in the traditional school environment. Regardless of the reason, it is important to ponder whether the median growth percentiles of students change as a function of length of enrollment. This information will inform realistic goals for both individual student and school wide performance expectations.

Figures 1 and 2 show the median growth percentiles in mathematics and reading as a function of the length of enrollment in an AEC. Again, students that attended traditional middle schools (years enrolled in an AEC=0) had 2007 median growth percentiles of 50 across all three grades.

When compared to students that did not attend an AEC, students that attended an AEC for one year (either in 2005-06 or 2006-07) showed substantially lower student growth percentiles in mathematics (Figure 1) in all three grades, ranging from the 30th to the 32nd percentile.

When comparing the median growth percentiles, in mathematics, between students that had attended and AEC for either one or two years, students who were enrolled in an AEC for both years had higher median growth percentiles in 2007 than students who were enrolled in an AEC for only one of the two academic years (ranging from the 37th to the 50th percentile).

Similar to the findings in Tables 5-8, it appears that students enrolled in an AEC during middle schools grow at a slower pace (i.e., have lower growth percentiles) than traditional middle school students. However, AEC students seem to benefit more from their time in an AEC (i.e., have a higher growth percentile) when enrolled for a longer period of time—especially if they enter an AEC at a younger age.

Figure 1. Median Student Growth Percentiles, in Mathematics, by Number of Years Enrolled in an AEC Middle School, 2007

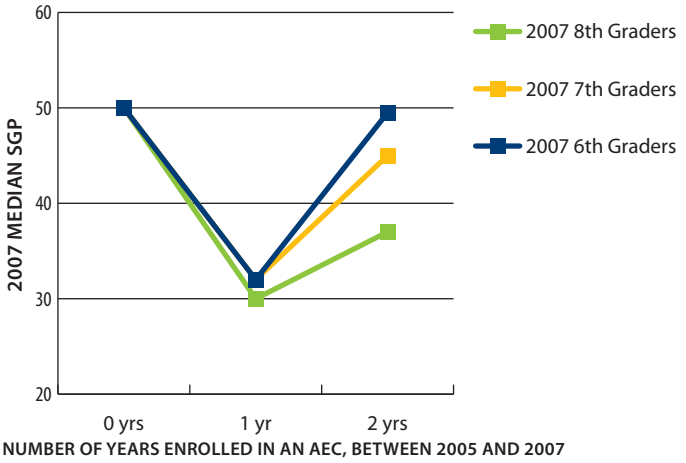
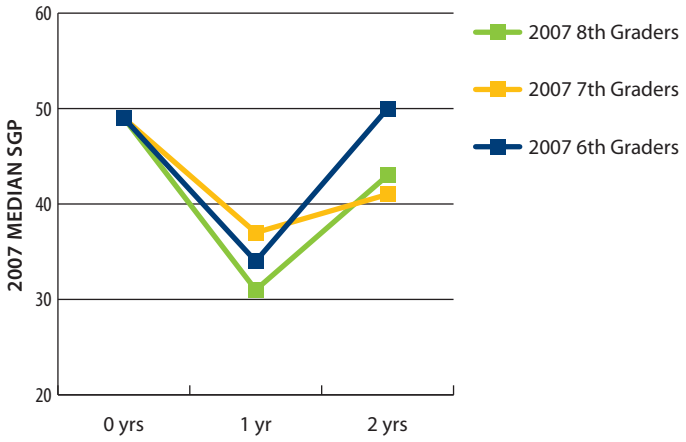


Figure 1. Median Student Growth Percentiles, in Reading, by Number of Years Enrolled in an AEC Middle School, 2007



Median 2007 growth patterns in reading, between students attending AECs for 0, 1, or 2 years (Figure 2), were very similar to those found in mathematics. There was a similar dip in the pattern of growth, showing that students that attended an AEC for one of the two years had lower median growth percentiles than either students who had not attended an AEC during that time (median growth percentiles of 50) or students that attended an AEC for both 2005-06 and 2006-07 (median growth percentiles ranging from 41 to 50).

Again, 6th grade students that had attended an AEC for both years produced median growth percentiles that were the same as those 6th graders that attended traditional middle school during those two years.

Extending on the analysis presented in Figures 1 and 2, the median 2008 growth percentiles among students that had attended an AEC for 0, 1, 2, or 3 years between 2005-06 and 2007-08 was investigated. Figure 3 shows the results for mathematics, while Figure 4 shows the results for reading.

Figure 3. Median Student Growth Percentiles, in Mathematics, by Number of Years Enrolled in an AEC Middle School, 2008

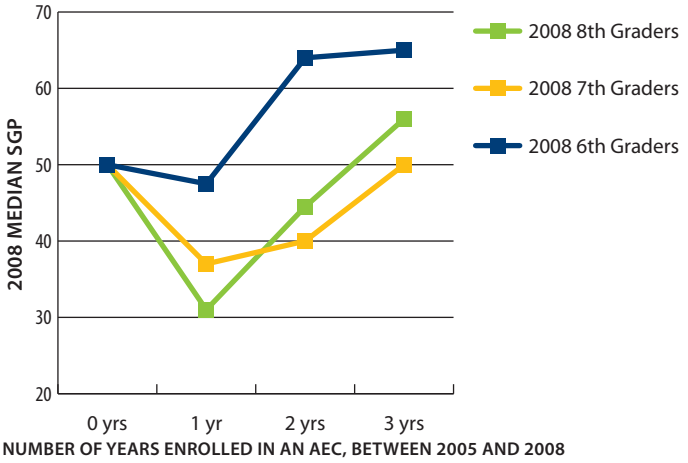
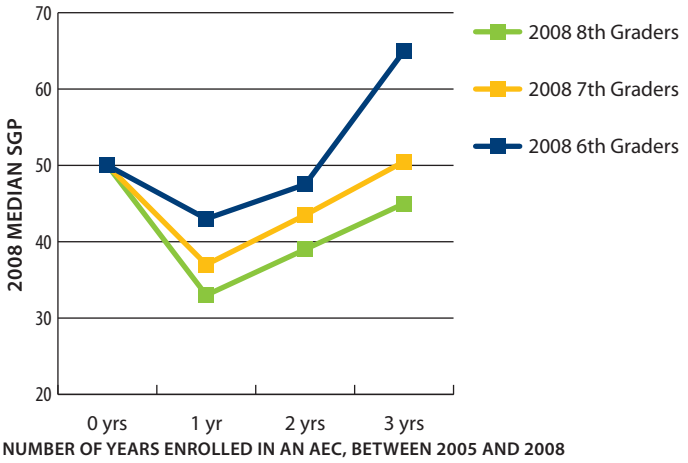


Figure 4. Median Student Growth Percentiles, in Reading, by Number of Years Enrolled in an AEC Middle School, 2008



Again, we see the dramatic difference between students that did not attend an AEC during that time and those that attended for one of the three years. We also see that the upward trend among students that attend AECs for multiple years continues to extend upward, especially for the 6th grade students.

These results suggest that students attending AECs for longer than one year tend to benefit greatly. It also appears that the earlier students begin utilizing alternative education models, the more they benefit.

Conclusions

Although middle schools students that attend AECs are a small fraction of the total middle school student population (less than one percent of students in each grade level, 6-8), there are 119 schools in Arizona that specifically cater to these high-risk students (i.e., students that have already dropped out or are at risk of doing so). These schools are often judged to be underperforming, because, at the aggregate level, students attending AECs do not perform as well on state standardized tests. In other words, a small fraction of students enrolled in AECs pass the AIMS tests each year.

In this era of high-stakes accountability, arguments against the use of status measures (such as percent proficient), in isolation, abound. Instead, educational professionals have argued for the use of longitudinal growth measures, in addition to or instead of status measures, for the purpose of assessing school effectiveness. However, if "typical" growth among students attending AECs is not equivalent to the "typical" growth of more traditional students, is holding AECs to the same growth expectations as traditional schools reasonable? Our hope is that policy makers utilize this evidence when considering this question.

The findings presented here suggest that an alternative growth target for AEC students, and the schools that serve them, may be in order—at least when using the growth percentile methodology.

Although students that attend AECs for multiple years may indeed show median growth percentiles that are closer to the state median, the number of students enrolled in an AEC for multiple years is quite small. For example, the average number of Arizona's students that were enrolled in an AEC for one year (per grade level) was 265, compared to 89 and 32 for students enrolled in an AEC for 2 and 3 years, respectively. A result that is not surprising given the mobility of students attending AECs and the goal of some AECs to transition students back into mainstream schools. However, knowledge that growth among students enrolled in AECs for multiple years tends to be higher than students enrolled for one year should help students, parents, and teachers to set realistic and attainable goals for these students. For internal accountability purposes, administrators may want to set differentiated goals around the growth of individual students, as a function of length of enrollment.

ABOUT THE AUTHORS

Jody Ernst, Ph.D., is the Director of Research and Evaluation for the Colorado League of Charter Schools. Jody's research focuses on accountability issues for schools that fall outside of the traditional education model, such as charter and alternative schools. Jody also works directly with schools to help set goals and benchmarks for internal accountability.

PROJECT FUNDING

The research presented in this report was provided by the US Department of Education's Office of Innovation and Improvement, as part of the Building Charter School Quality (BCSQ) initiative (Grant ID U282N060030).

ACKNOWLEDGEMENTS

A special thanks to Dr. Damian Betebenner for his advice and feedback on this project.

REFERENCES

Betebenner, D. W. (2008). Norm- and criterion-referenced student growth (Tech. Rep.). Dover, NH: National Center for the Improvement of Educational Assessment.

Carlson, D. (2003). Four methods of judging school quality and progress. AERA Conference Presentation Paper, Chicago, IL.

Kennelly, L. & Monrad, M. (2007). Approaches to dropout prevention: Heeding early warning signs with appropriate interventions (Tech Report). American Institutes for Research, National High School Center.

Linn, R.L. (2001). The design and evaluation of educational assessment and accountability systems (CSE Tech. Rep. No. 539). Los Angeles: University of California, Center for Research on Evaluation, Standards, and Student Testing.

Linn, R.L. (2003). Accountability: Responsibility and reasonable expectations (Tech. Rep.). Los Angeles: University of California, Center for Research on Evaluation, Standards, and Student Testing.

Linn, R. L., Baker, E. L., & Betebenner, D. W. (2002). Accountability systems: Implications of requirements for the No Child Left Behind Act of 2001. Educational Researcher, 31(6), 3-16.

Rubin, D. B., Stuart, E. A., & Zanutto, E. L. (2004). A potential outcomes view of value-added assessment in education. Journal of Educational and Behavioral Statistics, 29 (1), 103-116.

Singer, J. D., & Willett, J. B. (2003). Applied longitudinal data analysis. New York: Oxford University Press.

COLORADO LEAGUE *of*
CHARTER SCHOOLS

focus on achievement

Colorado League of Charter Schools
725 S. Broadway, Suite 7, Denver CO 80209

www.coloradoleague.org