Mathematics Performance of ALEKS Users on a State Test in the Rural Midwest

The McGraw Hill Efficacy Research team was asked to examine the association between the use of the ALEKS adaptive math solution and students' math state test scores in a medium-sized rural district in the Midwest region of the United States. The state test is administered across grades 3 through 11. ALEKS was implemented in grades 6 through 11. The first year of usage was 2022-2023.

Study Sample

The table below shows the demographic information for the district.

Student characteristics	Percentage
Hispanic	38%
White	42%
English Language Learners	12%
Free/reduced lunch	65%

State Test Performance

Overall, 55% of the students across the district had math scores on the state test that qualified as passing. Eight percent (8%) of the sample (519 students) were classified in the Advanced category and 46% of the sample (2,993 students) were Proficient. There were 2,926 students (45%) who were classified as Non-Proficient.

As part of the analysis, there were 5,461 ALEKS users and 977 non-users across grades 6-11 who had state test scores in spring 2023. The table below shows the differences between the groups across all grade levels in the proficiency categories. There were higher passing rates among ALEKS users than non-ALEKS users.

Proficiency	ALEKS Users	Non-users
Advanced	449 (8%)	70 (7%)
Proficient	2670 (49%)	323 (33%)
Non-Proficient	2342 (43%)	584 (60%)
Pass Rate	57%	40%

In examining the scale scores of the ALEKS users and non-users by grade level, there are also differences that can be seen. ALEKS users in grades 6 through 10 all scored higher than the average grade level scale score for the district. Only in grade 11 did ALEKS students perform

slightly below average while the non-users scored higher. Across each grade level the percentage of students considered as passing were higher among the ALEKS users than the non-users. The table below breaks down the results.

Grade	Average State Test Scale Score	Users		Non-Users	
		Scale Score	% Pass	Scale Score	% Pass
6	465.10	**465.38**	51.70%	459.67	31.37%
7	484.75	**486.69**	54.21%	468.22	46.79%
8	516.34	**517.33**	50.59%	498.36	26.79%
9	518.89	**523.48**	42.03%	492.73	18.29%
10	547.66	**552.44**	50.80%	531.86	29.70%
11	575.89	573.38	42.53%	**581.09**	40.63%

Detailed ALEKS usage

In the first year of ALEKS usage, students across grades 6-11 mastered an average of 157.18 mathematics topics within the ALEKS platform. They spent an average of 5.8 hours across 41.69 days using ALEKS. Consistently, students in grades 8 and 9 had above average usage according to these metrics. Detailed information can be found in the table below.

| Grade	Number of Topics			Time (hours)			Days		
	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.
6 (n=971)	137.59	2	417	4.9	0.15	32.74	39.66	1	139
7 (n=926)	127.35	0	472	4.35	0.16	49.60	35.55	1	123
8 (n=1024)	**205.09**	**4**	**615**	**7.49**	**0.21**	**80.18**	**60.69**	**1**	**164**
9 (n=997)	**218.81**	**0**	**615**	**7.35**	**0.25**	**79.26**	**50.31**	**1**	**116**
10 (n=880)	139.92	0	539	5.5	0.01	55.89	32.46	1	98
11 (n=663)	114.32	0	530	5.41	0.01	60.39	31.47	1	102

Correlations between Scale Score and ALEKS Usage

A Pearson correlation coefficient was computed to assess the relationship between usage and state test scale score. The strongest relationship was found between the number of topics completed and the scale score ($r = .47$, $p < .001$). There were weaker relationships between average number of hours spent ($r = .26$, $p < .001$) as well as number of days spent ($r = .13$, $p < .001$). Looking at the correlations by grade level, the strength of the relationship between the number of topics completed is much higher, with the strongest correlation at grade 8 ($r = .83$, $p < .001$). The table below shows the results of that analysis.

Grade	r (Scale Score and Number of topics)
6	0.74*
7	0.37*
8	0.83*
9	0.58*
10	0.56*
11	0.4*

2023 State Test Passing Rates and ALEKS Usage

As with the correlations between scale scores and ALEKS usage, there is a similar relationship between the number of topics completed and average days spent by students who passed the state test (Advanced or Proficient) and those who were considered as not passing (Non-Proficient). Students who passed the state test did spend a slightly smaller amount of time in ALEKS than those who did not pass.
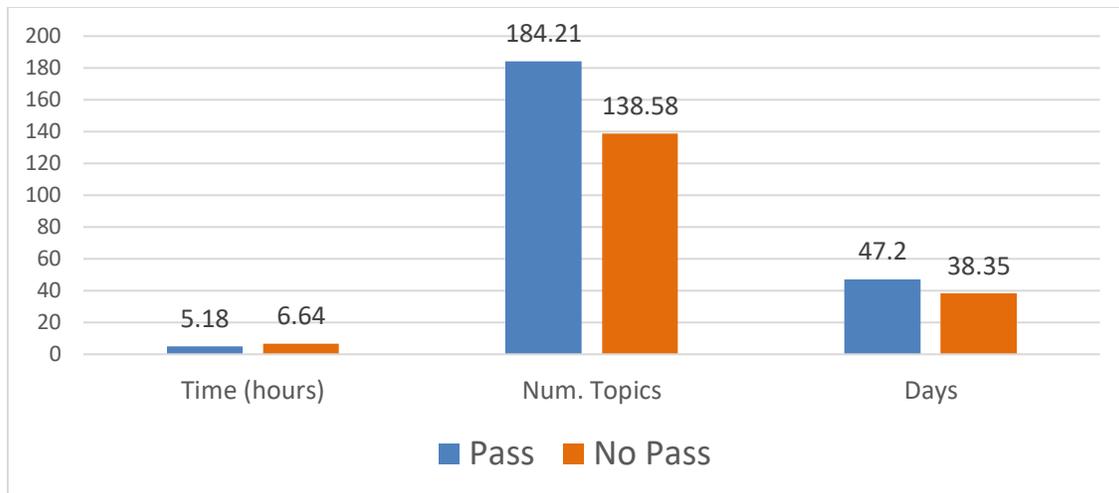
Conclusion

This study examined the performance of students in a medium-sized rural district in the midwestern United States who used ALEKS in grades 6-11. Overall, students who used ALEKS performed better than their peers on the state mathematics test. It was also found that the number of topics completed had the strongest relationship with the scale score and this was especially true when examined by grade level. The analysis also showed that the students who passed the state test (Advanced or Proficient) completed a larger number of topics and spent more days on average than those who were considered as not passing (Non-Proficient).

Disclaimer

Differences on state test performance can be due to a number of factors, including the innate ability and prior education of the students participating, as well as differences among teachers and their pedagogies. We believe that, even taking these factors into account, *ALEKS* can contribute to improvements in student outcomes.