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Coursemojo Efficacy Summary Report, Charter Network in Northern California Grades 5–8, 2025–2026



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PROGRAM DESCRIPTION

Coursemojo (Mojo) is an innovative teaching and learning assistant designed to meet the diverse needs of all learners. As a curriculum-aligned tutor for students, Mojo takes the texts and tasks from the curriculum and transforms them into interactive and differentiated experiences for students. Mojo also provides a set of tools designed to help all teachers execute the moves of effective teachers, including a live dashboard to use for conferencing, real-time trends in student misconceptions with suggested discussion questions, and celebrations of exemplary work. This platform is aligned specifically with top-rated, English Language Arts curricula. Importantly, most of the Coursemojo activity involves students collaborating with one another rather than engaging in isolated screen time.

STUDY DETAILS

Sample Description

- 2,889 students, grades 5–8 (cross-grade analyses)
- Grade bands are presented as Grades 5–6 (Elementary) and Grades 6–8 (Middle). Grade 6 is intentionally included in both bands to reflect variation in how schools classify sixth grade across elementary and middle school contexts. Because Grade 6 is included in both analyses, the grade-band estimates are not independent.

Demographics

78% Free or reduced-priced lunch eligible (FRPL)
64% Latinx, 25% AAPI, 8% Black
27% Multilingual Learners (ML)
14% Students with individualized education program (IEP)

Location

A charter school network in Northern California

Time Frame

2025–2026; Beginning of Year (BOY) to End-of-Year (EOY)

Methodology

- Design: quasi-experimental design (matched)
- Assessment Measure: DIBELS Composite: ORF & Maze, z-scores were created to combine grades
- School fixed-effects ANCOVA models controlling for baseline reading score, grade, FRPL, ML & IEP status
- See the Appendix for all statistical notations

STUDY SUMMARY

LXD Research conducted a quasi-experimental matched comparison design to examine the impact of Coursemojo in a Northern California charter school network in the 2025–26 school year. Literacy outcomes were measured using the DIBELS Composite assessment in grades 5–8. Individual student data comparing beginning-of-year to end-of-year progress were used to estimate the program impacts of Coursemojo, adjusted for baseline scores. Results are expressed as percentile points relative to a typical non-user starting with the same score.

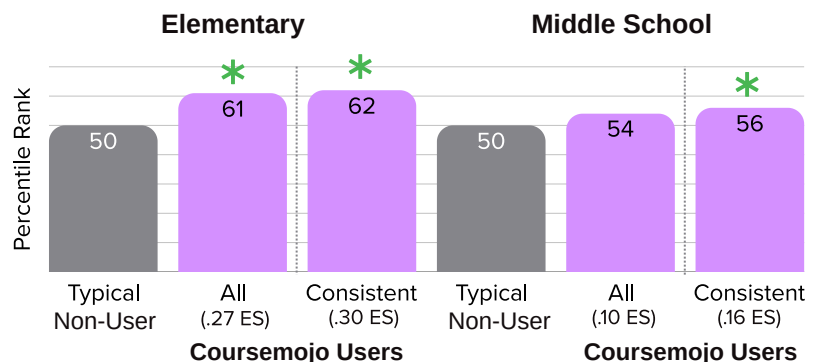
Key Findings

- Across grades 5–8, Coursemojo users scored higher at the end of the year than similar non-users starting with the same score: about 6 points overall (.14 ES) and about 7 points for Consistent users (20+ weeks of use; .18 ES).
 - In grades 5–6 (elementary), Coursemojo's advantage was about 11 points (.27 ES) regardless of usage group.
 - In grades 6–8 (middle), Consistent users scored about 6 points higher (.16 ES); all users were 4 points higher but not significantly different.
- A larger share of Consistent users made more than a year of reading growth (19%, compared with 11% of non-users).
- Consistent users also ended the year at/above grade level more often than they started it. In middle school, the share rose 13 points (40% to 53%) while non-users stayed at 45%. In elementary school, it rose from 39% to 45%, while non-users fell from 54% to 44%.



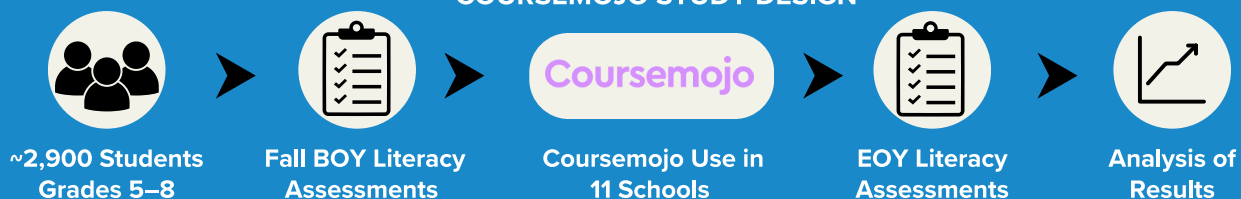
Consistent Coursemojo users' outcomes reflected up to 12 additional percentile points in reading compared to a typical non-user.

Advantage of Coursemojo Users over Non-Users on EOY DIBELS Composite (Percentile Rank)



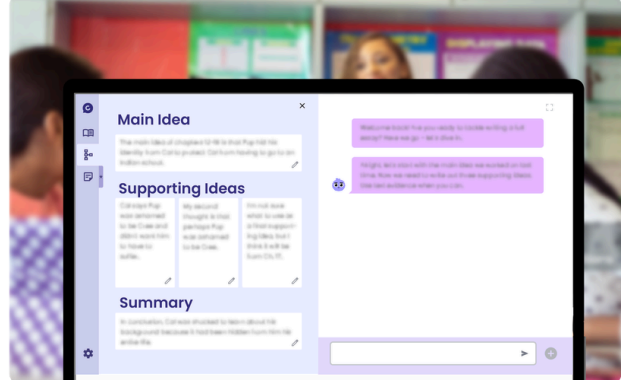
Percentile ranks show where a typical student starting at the 50th percentile would be expected to finish the year, not actual percentile ranks. Stars mark differences from non-users: Elementary All ($p < .01$); Elementary Consistent ($p < .001$); Middle School Consistent ($p < .05$).

COURSEMOJO STUDY DESIGN



HOW COURSEMOJO WORKS

The platform integrates seamlessly with existing high quality instructional materials; in this charter school network the core curriculum was Fishtank ELA. Teachers were asked to incorporate AI-powered activities daily as part of independent practice (Target Task) during the literacy period. Students engaged with texts through a structured three-tiered approach that builds comprehension and writing skills systematically. The AI assistant provides immediate, personalized feedback during activities while collecting data in real time to help teachers facilitate more effective conferencing and whole-class discussions.



USAGE FREQUENCY

Students engaged with an average of 19 activities over the course of the school year, with considerable variation: some students completed as few as 1 activity while others completed as many as 89. In a typical active month, students entered around 3 activities. Students were active for an average of 5 months across the school year; Consistent users were active for a median of 29 active weeks and Short-Term users for 15 active weeks. On the months they used Coursemojo, students completed about 59% of the activities they started. Students averaged 2 writing activities per active month. First attempt scores averaged 1.9 out of 4 and improved to 2.1 on final attempts, suggesting students made incremental gains within sessions.

Students were grouped by Coursemojo usage level based on how long they engaged with the platform. Short-Term Use students were active for fewer than 20 weeks, and about a third were in classes that received access in the winter. The three groups are described in the table below (matched analytic sample). All users combine the Consistent and Short-Term groups with 39 licensed students who had no recorded use. Students who started using Coursemojo after February 20 (<10 weeks from posttest) are excluded.

Coursemojo Usage Group Patterns and Grade-Level Sample Sizes

Group	Usage Pattern	Grade 5	Grade 6	Grade 7	Grade 8	Total
Consistent Use	20+ weeks of active use	195	155	71	562	983
Short-Term Use	Fewer than 20 weeks of active use	282	281	442	125	1,130
Non-Users	Not licensed (no Coursemojo access)	194	273	175	95	737

Note: Pooled grades 5–8 sample. Grade bands were matched separately (non-users: n = 256 in grades 5–6; n = 614 in grades 6–8).

READING GROWTH ACROSS ALL GRADES

At the start of the year, Coursemojo users and non-users had similar DIBELS scores (<.25 SD between groups). Coursemojo users outpaced non-users in end-of-year reading performance across grades 5–8, and the advantage was largest in grades 5–6. In school fixed-effects models, Consistent users (20 or more weeks) across grades 5–8 scored .18 ES higher than non-users, about 7 percentile points. In grades 5–6, all users scored .27 ES higher (about 11 percentile points) and Consistent users .30 ES higher (about 12 percentile points). In grades 6–8, the difference for all users was smaller and not statistically significant (.10 ES, about 4 points), but Consistent users scored .16 ES higher (about 6 points).

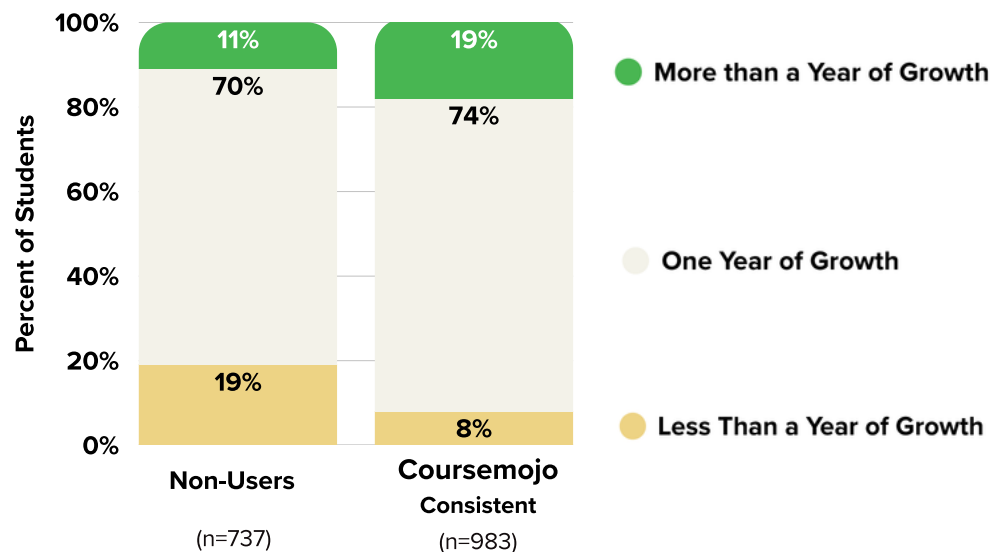
Benchmark Profiles for All Students

The clearest picture of program impact comes from benchmark-level movement: whether students moved up a reading level, stayed on track, or fell behind over the year. Across grades 5–8, students who used Coursemojo regularly (20 or more active weeks) made more than a year of reading growth at a higher rate than non-users, and fell behind at a lower rate.

Among Consistent users, 19% made more than a year of reading growth by the end of the year, compared with 11% of non-users. Only 8% of Consistent users lost ground over the year, compared with 19% of non-users.

One year of growth, meaning a student stays at the same benchmark level from fall to spring, reflects expected, on-track progress. Coursemojo users did not just keep pace: more of them exceeded expectations, and fewer slipped back.

Movement in DIBELS Benchmark Level BOY to EOY Across Grades



🎯 Consistent Coursemojo users were more likely to make more than a year of reading growth than non-users (19% vs. 11%).

🎯 Consistent Coursemojo users were also less likely to fall behind (8% vs. 19%).

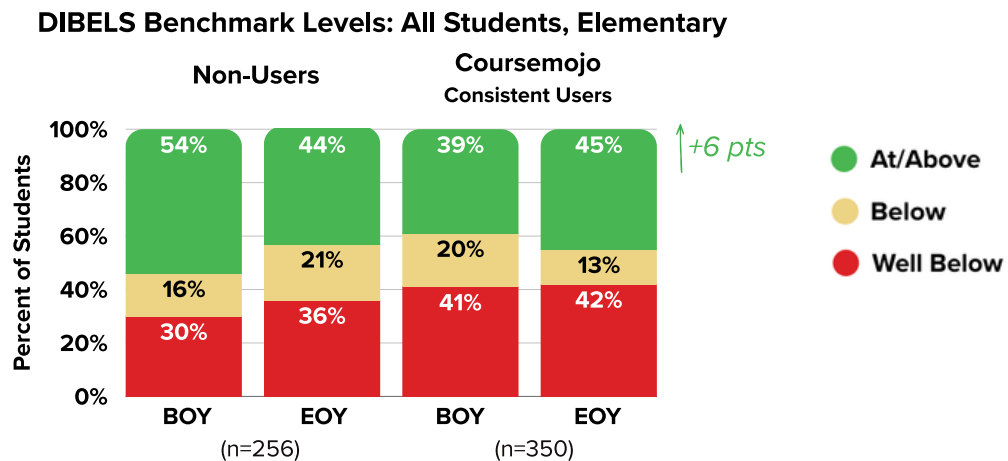
READING SKILL MOVEMENT: ELEMENTARY SCHOOL, GRADES 5–6

DIBELS is a reading assessment that measures foundational skills like fluency and comprehension at multiple points throughout the school year. It produces a composite score that reflects overall reading development and is benchmarked against national standards to identify whether students are reading at, above, or below grade level. DIBELS was used as the outcome measure because it captures within-year growth.

Benchmark Profiles for All Students

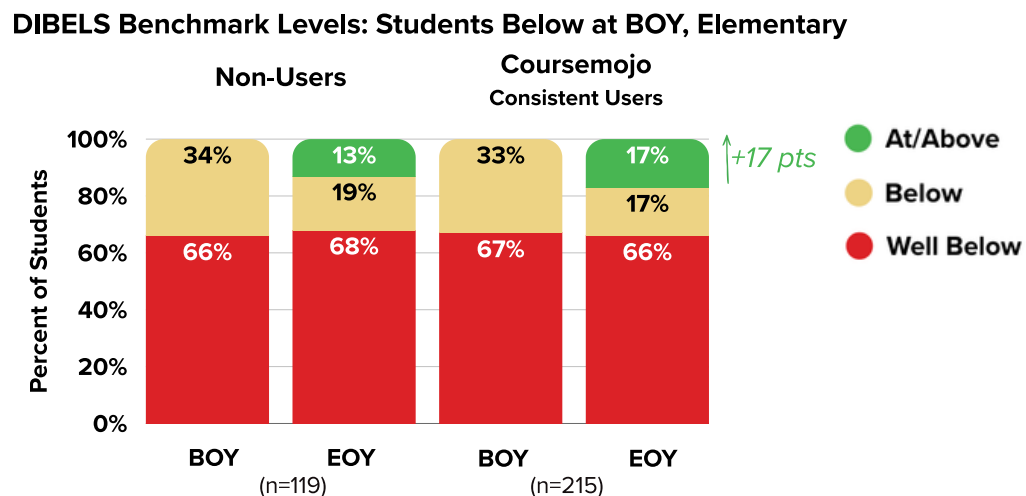
Additional exploration was conducted to compare Consistent users with non-users. For the Elementary Consistent group, students reading at or above grade level significantly increased from the beginning to the end of the year, from 39% to 45%.

The non-users significantly declined from 54% to 44%, and over twice as many fell out of at/above as moved into it. The share Well Below was flat for Consistent users (41% to 42%) and rose for non-users (30% to 36%).



Benchmark Profiles for Students who Started Below Grade Level

Students made meaningful improvements, with some students advancing from below grade level to at/above grade level in just one year. For this striving reader group, Consistent users had 17% of students advance to at/above grade level, while non-users had 13%. Consistent users' share of Well Below decreased by 1.4 points, while non-users' increased by 2.5 points.



Note: Bars may not total 100% due to rounding; numbers in the text may not match the graphs due to rounding. Grade 6 is intentionally included in both grade bands to reflect variation in elementary and middle school grade configurations. Grade-band estimates therefore share Grade 6 students and are not independent.



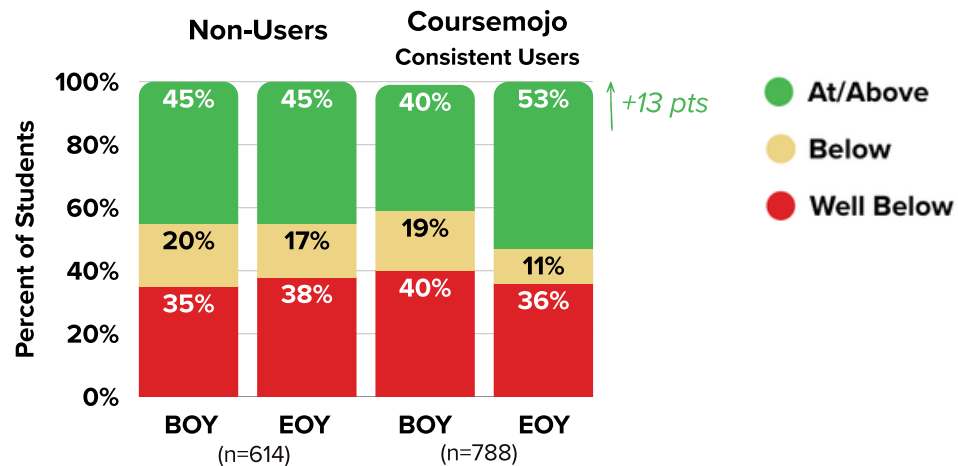
READING SKILL MOVEMENT: MIDDLE SCHOOL, GRADES 6–8

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Benchmark Profiles for All Students

Additional exploration was conducted to compare Consistent users to non-users in Middle School. For this Consistent group, students reading at or above grade level increased significantly from the beginning to the end of the year — from 40% to 53%. Among Consistent users, 5.43 students moved up to at/above grade level for every one who fell below it (non-users: .98). Consistent users had a decrease in Well Below Benchmark of 4.4 points, while non-users had an increase of 3.7 points.

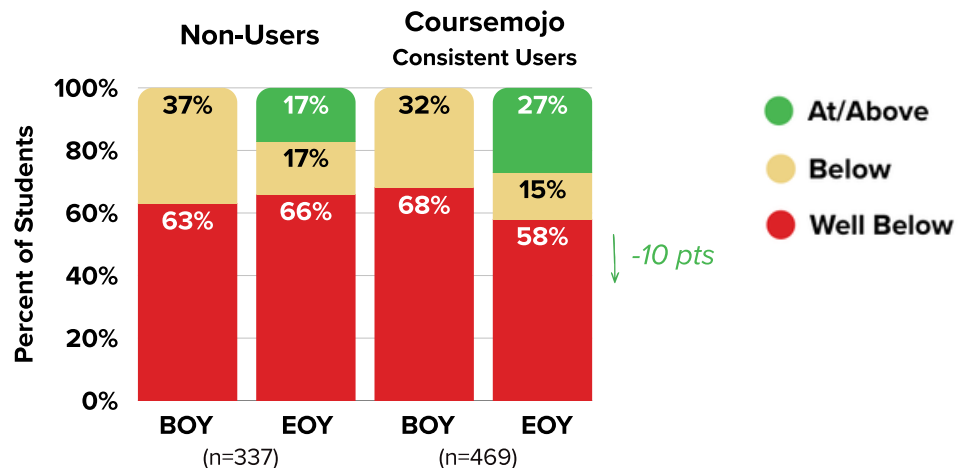
DIBELS Benchmark Levels: All Students, Middle School



Benchmark Profiles for Students Below Grade Level

Students made meaningful improvement, with some students advancing from below grade level to at/above grade level in just one year. For this striving reader group, Consistent users had 27% of students advance to at/above grade level, while non-users had 17%. Consistent users had a decrease in Well Below Benchmark of about 10 points, while non-users had an increase of about 3 points.

DIBELS Benchmark Levels: Students Below at BOY, Middle School



Note: Bars may not total 100% due to rounding; numbers in the text may not match the graphs due to rounding. Grade 6 is intentionally included in both grade bands to reflect variation in elementary and middle school grade configurations. Grade-band estimates therefore share Grade 6 students and are not independent.

HOW ENGAGEMENT SHAPED OUTCOMES: GRADES 5–8

Understanding Usage Groups

Students are grouped by how long they used Coursemojo (see page 2): Consistent Use students were active for 20 or more weeks, Short-Term Use students for fewer weeks, and students in grades without a license served as the non-user comparison group. All users combines both groups with licensed students who had no recorded activity. The pattern of how engagement drove gains differed between elementary and middle school grades. A rigorous analysis controlling for school, baseline reading score, grade level, FRPL eligibility, multilingual learner status, and IEP status found statistically significant advantages for Coursemojo users in all three groups in grades 5–6 and, in grades 6–8, for Consistent users only. Results are expressed as percentile points relative to a typical non-user starting with the same score.

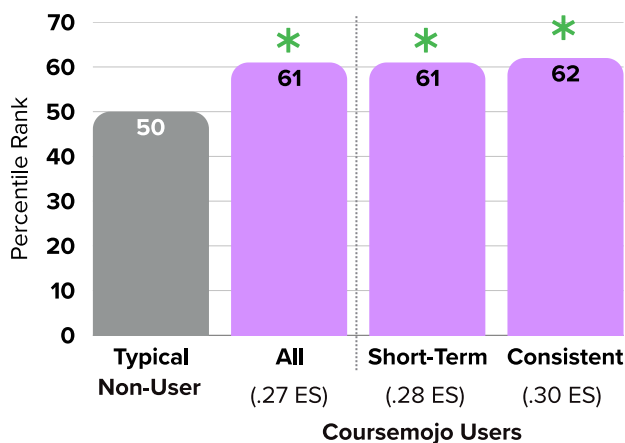
Elementary School Grades 5–6

Students were spread across the usage groups: 47% were in Short-Term Use, 29% in Consistent Use, 21% in the non-user group, and 3% were licensed with no recorded activity. Compared with non-users, Short-Term Use students scored about 11 percentile points higher at the end of the year (.28 ES), all Coursemojo users about 11 points higher (.27 ES), and Consistent Use students about 12 points higher (.30 ES). All three differences were statistically significant ($p < .01$), and the estimates were similar across levels of use.

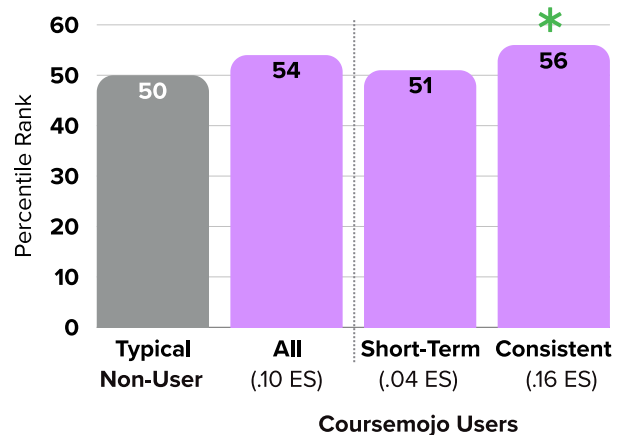
Middle School Grades 6–8

Usage built toward the upper grades: 37% were in Short-Term Use, 35% in Consistent Use, 27% in the non-user group, and 1% were licensed with no recorded activity. The Consistent share was 21% of sixth graders, 10% of seventh graders and 70% of eighth graders, while the non-user share fell from 40% to 14%. Compared with non-users, Short-Term Use students scored about 1 percentile point higher (.04 ES) and all users about 4 points (.10 ES); neither difference was statistically significant. Consistent Use students scored about 6 points higher (.16 ES), a statistically significant difference ($p < .05$). About a third of Short-Term Use students were in classes that received access in the spring, so the usage groups reflect timing of access as well as engagement.

Elementary Grades: Advantage of Coursemojo Users over Non-Users on DIBELS Composite



Middle School Grades: Advantage of Coursemojo Users over Non-Users on DIBELS Composite



Percentile ranks show where a typical student starting at the 50th percentile would be expected to finish the year, not actual percentile ranks. Stars mark differences from non-users: Elementary All and Short-Term ($p < .01$), Consistent ($p < .001$); Middle School Consistent ($p < .05$).

Note: Grade 6 is intentionally included in both grade bands to reflect variation in elementary and middle school grade configurations. Grade-band estimates therefore share Grade 6 students and are not independent.



CONCLUSION

This study provides encouraging evidence that Coursemojo is associated with stronger literacy growth. Across grades 5–8, students who used Coursemojo for 20 or more weeks (Consistent users) scored .18 ES higher than comparable non-users at the end of the year, about 7 percentile points. In grades 5–6, all users scored .27 ES higher (about 11 points) and Consistent users .30 ES higher (about 12 points). In grades 6–8, Consistent users scored .16 ES higher (about 6 points), while the difference for all users (.10 ES) was not statistically significant. Consistent users were also more likely to make more than a year of benchmark growth (19% vs. 11%) and less likely to fall behind (8% vs. 19%).

The engagement analysis indicates that implementation patterns differed by grade band:

- **Elementary School:** Effects were positive at every level of use and similar in size.
- **Middle School:** Short-Term Use showed no significant advantage; only Consistent Use (20 or more weeks) showed a significant advantage.

Study Limitations

This evaluation uses a quasi-experimental comparison design in which non-users were matched to Coursemojo students on grade, baseline reading score, and demographics, with school fixed effects in the models. Licenses were assigned to school-grade groups, however, and in the five schools with both licensed and unlicensed students the two groups were in different grades, so unobserved differences between groups may account for some portion of the observed effects. Coursemojo use was not randomly assigned, meaning that differences in teacher practice, instructional philosophy, or school-level priorities may have influenced both who used the platform and how consistently. Additionally, this study does not capture what instructional supports or interventions were in place for striving readers — a meaningful gap given that more than half of students began the year below grade level, and schools serving struggling readers often layer in additional targeted supports that could influence end-of-year outcomes independent of Coursemojo use.

Two further features of the data are worth noting. Attrition was low overall (6.5%) and lower among Coursemojo students (5.2%) than non-user students (9.7%). Most Coursemojo losses (101 of 117) were licensed students with no recorded use, most of whom had left their school, and non-user losses were concentrated in three schools. Users and non-users also differed in composition after matching — users were more often Latinx and multilingual learners, non-users more often AAPI — in part because the grade 5 non-user group comes from two schools that serve mostly AAPI students (62% AAPI, versus 16% of licensed grade 5 students). After matching, the standardized differences for Latinx and AAPI students were each below .50 SD. Because licenses were assigned to school-grade groups, standard errors also account for that clustering; under this conservative approach the grades 6–8 result for all users was not statistically significant, and the result for Consistent users was only just significant ($p = .046$). Without school fixed effects, the Consistent estimates were smaller and not statistically significant in grades 5–8 or 6–8 ($p = .09$ and $p = .27$), although they remained significant in grades 5–6.

Usage groups reflect when classes received access, as well as how students engaged. Most non-users were in classes that never received a license, and about a third of Short-Term Use students were in classes that began using Coursemojo in the winter, so differences between usage groups should not be read as a pure dose-response relationship across a full year. Findings are specific to this charter school network in Northern California and the 2025–26 school year, which may limit generalizability to other settings. The one-year timeframe captures immediate literacy outcomes but does not address whether observed gains persist or compound over time.

Correction Notice - October 2026

This version of the report replaces the July 2026 version. After reviewing the July analysis, we corrected errors in how student records were prepared, rebuilt the comparison and usage groups, re-ran every analysis, and revised the interpretation of the results. We made these changes so that the outcome scores are accurate, so that Coursemojo students are compared with similar non-users, so that the uncertainty in the estimates reflects how licenses were assigned, and so that results are reported in a way that aligns with the What Works Clearinghouse (WWC) improvement index. Because these changes touch nearly every figure in the report, this notice explains what changed and how the results were affected.

What changed

- **Student records.** We corrected an error in how student records were prepared, which had affected the end-of-year scores for a portion of students, and recomputed all outcomes.
- **Comparison group.** Comparison students are now matched to Coursemojo students on baseline reading score, FRPL, multilingual learner status, IEP status and race/ethnicity (exactly on grade), and classes that began Coursemojo fewer than 10 weeks before end-of-year testing were excluded.
- **Usage groups.** Consistent users (20 or more weeks of use), Short-Term users (fewer than 20 weeks) and all Coursemojo users combined are each compared with non-users.
- **Statistics.** Standard errors are now clustered by school-grade group.
- **Reporting.** Months-of-growth translations were removed because they relied on a growth benchmark that does not fit the DIBELS Composite. Results are now reported as effect sizes (ES) and percentile points, which aligns with the WWC improvement index and needs no outside benchmark. Each percentile figure shows where a typical non-user starting at the 50th percentile would be expected to finish the year with Coursemojo.

How the results were affected

- **Direction.** On average, Coursemojo users still finished the year ahead of comparable non-users.
- **Effect size.** For all users, the estimate is larger in grades 5–6 (.27 ES, previously .18 ES) and unchanged in grades 6–8 (.10 ES, previously .10 ES).
- **Certainty.** In grades 6–8, the all-users result is not statistically significant, but the Consistent-user result is (.16 ES, $p = .046$). All three groups are significant in grades 5–6.
- **Comparability.** Because Consistent use is now defined as 20+ weeks, Consistent-user figures are not directly comparable with the July report's figures for sustained users. The Appendix (Tables A3 and A4) has the full results.

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Supporting Statistical Detail

SAMPLES, ATTRITION, AND BASELINE EQUIVALENCE

Relevant to: report page 1, study details; study limitations

The eligible sample includes all grade 5–8 students with a valid BOY score, excluding one school-grade group that began Coursemojo less than 10 weeks before end-of-year testing began on May 1, 2026 (SF Bay, grade 7; 85 students). The Coursemojo group includes all students in school-grade groups with a Coursemojo license, including licensed students with no recorded use; the comparison group includes students in groups without a license. Each analytic sample was matched separately (frontier matching on BOY score, FRPL, multilingual learner status, IEP status, and race/ethnicity, exact on grade), keeping all Coursemojo students and removing the non-user students least similar to them until BOY scores differed by no more than 0.25 SD and every demographic variable by less than 0.50 SD. Matched samples: grades 5–8, 2,152 Coursemojo and 737 nonusers; grades 5–6, 945 and 256; grades 6–8, 1,657 and 614.

Table A1. Attrition (students with a valid BOY score)

Sample	Coursemojo lost	Non-Users lost	Overall	Differential (pct. points)
Grades 5–8	117 of 2,269 (5.2%)	97 of 1,004 (9.7%)	6.5%	4.5
Grades 5–6	73 of 1,018 (7.2%)	40 of 597 (6.7%)	7.0%	–0.5
Grades 6–8	71 of 1,728 (4.1%)	91 of 775 (11.7%)	6.5%	7.6

Note. Attrition is calculated on the eligible sample (3,273 students) as the share with a BOY score but no EOY score. Most students lost from the Coursemojo group were licensed students with no recorded usage who were no longer enrolled at the end of the year. Removing non-users through matching with Baseline scores is not counted as attrition.

Table A2. Baseline equivalence after matching

Variable	Coursemojo (grades 5–8)	Non-Users (grades 5–8)	SMD 5–8	SMD 5–6	SMD 6–8
BOY composite (z)	0.00	0.20	–0.21	–0.24	–0.10
FRPL	78.4%	77.3%	0.03	0.10	–0.06
Multilingual learner	31.1%	15.5%	0.36	0.40	0.33
IEP	15.8%	8.8%	0.20	0.19	0.07
Latinx	70.4%	47.2%	0.49	0.24	0.49
AAPI	19.5%	39.3%	–0.47	–0.49	–0.24
Black	6.9%	11.5%	–0.17	0.16	–0.42
White	1.3%	0.8%	0.04	0.06	–0.02
Other	2.0%	1.1%	0.07	0.17	–0.07

Note. SMD is the standardized mean difference (Coursemojo minus Non-Users) divided by the pooled SD. BOY composite is in within-grade z units. All samples meet the thresholds (BOY $\leq$ 0.25; demographics $<$ 0.50). Balance is assessed for each sample as a whole; within grade 5 alone, Non-Users (from two schools) remained more heavily AAPI.

OUTCOME RESULTS

Relevant to: report page 1, key findings; pages 6–7, engagement findings

Table A3. Effect of Coursemojo on the EOY DIBELS 8 composite (school fixed effects)

Band	Group (vs. Non-Users)	Effect size (d)	95% CI	p	Composite points [95% CI]	Expected percentile
5–8	Consistent	.18	[0.05, 0.30]	.006*	+8.0 [+2.7, +13.3]	57th
5–8	Short-Term	.10	[–0.02, 0.21]	.089†	+4.6 [–0.2, +9.4]	54th
5–8	All Coursemojo	.14	[0.02, 0.26]	.022*	+6.4 [+1.3, +11.5]	56th
5–6	Consistent	.30	[0.15, 0.45]	< .001*	+13.5 [+6.3, +20.7]	62nd
5–6	Short-Term	.28	[0.13, 0.44]	.001*	+12.5 [+5.5, +19.5]	61st
5–6	All Coursemojo	.27	[0.12, 0.43]	.001*	+12.2 [+5.0, +19.4]	61st
6–8	Consistent	.16	[0.003, 0.32]	.046*	+7.3 [+0.4, +14.2]	56th
6–8	Short-Term	.04	[–0.11, 0.18]	.601	+1.9 [–4.2, +8.1]	—
6–8	All Coursemojo	.10	[–0.06, 0.26]	.219	+4.7 [–2.2, +11.6]	—

* $p < .05$. † $p < .10$ (trend). Expected percentile is shown for results with $p < .10$.

Usage groups. Consistent users had 20 or more weeks of Coursemojo use (span from first to last active date), in line with common definitions of consistent use; Short-Term users had fewer than 20 weeks. All Coursemojo also includes licensed students with no recorded use.

Type of effect size. Effect sizes are covariate-adjusted standardized mean differences, a Cohen's d -type effect size: the end-of-year difference between groups, after adjustment, in within-grade standard deviations of the EOY composite (all 2025–26 students). The expected percentile shows where an average student (50th percentile) would be expected to score with that effect. For scale, matched Non-Users gained about 101 composite points from BOY to EOY.

Model. ANCOVA of the EOY composite on group, controlling for BOY score, grade, FRPL, multilingual learner status, IEP status, and school (school fixed effects). Standard errors are clustered by school-grade group, the level at which licenses were assigned, with t distributions on clusters minus one degrees of freedom. Within-school comparisons come from five schools that had both licensed and unlicensed grades (three in grades 5–6; two in grades 6–8). Grade 6 students appear in both grade bands.

BENCHMARK MOVEMENT

Relevant to: report page 1 callout; pages 3–5

Table A4a. Movement across benchmark levels (Well Below, Below, At/Above), Consistent users vs. comparison

Band	Consistent: up / same / down	Comparison: up / same / down	Odds ratio, moving up a level [95% CI]	p	Odds ratio, moving down a level [95% CI]	p
5–8	19% / 74% / 8% (n = 983)	11% / 70% / 19% (n = 737)	1.84 [1.39, 2.43]	< .001*	0.36 [0.26, 0.48]	< .001*
5–6	14% / 76% / 9% (n = 350)	9% / 70% / 21% (n = 256)	1.69 [1.00, 2.85]	.064†	0.40 [0.25, 0.64]	< .001*
6–8	21% / 73% / 6% (n = 788)	13% / 70% / 17% (n = 614)	1.75 [1.31, 2.35]	< .001*	0.34 [0.24, 0.49]	< .001*

Note. Odds ratios compare Consistent users with comparison students (matched samples); values above 1 mean higher odds for Consistent users. Moving up a level is any move to a higher benchmark level from BOY to EOY (for example, Well Below to Below). Unadjusted; p-values from chi-square tests. * p < .05; † p < .10.

Table A4b. Movement across benchmark levels for striving readers (below benchmark at BOY), Consistent users vs. comparison

Band	Consistent: up / same / down	Comparison: up / same / down	Odds ratio, moving up a level [95% CI]	p	Odds ratio, moving down a level [95% CI]	p
5–8	31% / 62% / 7% (n = 601)	22% / 62% / 16% (n = 366)	1.53 [1.13, 2.06]	.007*	0.41 [0.27, 0.62]	< .001*
5–6	23% / 68% / 9% (n = 215)	19% / 70% / 11% (n = 119)	1.26 [0.73, 2.20]	.488	0.79 [0.38, 1.66]	.670
6–8	35% / 59% / 6% (n = 469)	23% / 64% / 13% (n = 337)	1.72 [1.26, 2.36]	< .001*	0.42 [0.26, 0.69]	< .001*

Note. Striving readers were Well Below or Below benchmark at BOY. Moving up includes Well Below to Below, Well Below to At/Above, and Below to At/Above; moving down is Below to Well Below. Unadjusted odds ratios on the matched samples; p-values from chi-square tests. * p < .05; † p < .10. Exploratory subgroup.



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