Promising Evidence of ABCmouse Closing the Achievement Gap and Minimizing Summer Learning Loss:
A Large-Scale Study of Children Ages 2–8

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Key Findings

- Based on a sample of more than 14,000 children ages 2–8, using ABCmouse for at least 45 minutes and completing 15 Learning Activities across three separate days per week can increase learning and minimize summer learning loss.

- Children who use ABCmouse more— whether by completing structured lessons or unstructured free play activities—show greater learning gains.

- Regular ABCmouse usage can help children of all skill levels, particularly those who start the summer with lower skills, catch up to higher-skilled peers by summer's end, closing the gap by up to 87 percent.

- More than 80 percent of parents reported that, since using ABCmouse, their children were more motivated to learn and were more independent in completing Learning Activities.

Overview

During the summer months, school-based learning is typically no longer a part of children's daily lives. While children in middle- and higher-income families may continue to learn during the summer from educational resources and enrichment activities their families can provide, children in less-affluent families are more likely to lose access to books, educators, meals, and organized activities when schools close.[1] Achievement gaps between students of different socioeconomic groups widen more during the summer than during the school year (i.e., summer learning loss), largely due to unequal learning opportunities in children's homes and communities.[2] Exacerbating this phenomenon, COVID-19-related school closures have kept tens of millions of children away from schools for many months, which has been particularly detrimental to children in low-income families.[3]

Schmidt Futures, a philanthropic organization that supports educational and commercial efforts with a public purpose, awarded a grant to WestEd to conduct an exploratory study focused on how parents used ABCmouse to support learning at home during the summer of 2020. WestEd is a nonprofit research, development, and service agency with deep expertise in evaluating the impact of educational programs. For this first independently funded study of ABCmouse, WestEd researchers collaborated with Age of Learning's in-house Efficacy Research team on study design and data analysis. Age of Learning recruited the participants and oversaw data collection.

1 Alexander, K.L., Entwisle, D.R., & Olson, L. S. (2007). Lasting consequences of the summer learning gap. *American Sociological Review*, 72 (2), 167–180.
2 Pitcock, S. (2018). The case for summer learning: why supporting students and families all year is vitally important. *American Educator*, *42* (1), 4–8.
3 Dorn, E., Hancock, B., Sarakatsannis, J. & Vriuleg, E. (2020). COVID-19 and learning loss—disparities grow and students need help. McKinsey & Company.

Program

ABCmouse *Early Learning Academy* is a comprehensive digital early learning resource for children in preschool, prekindergarten, kindergarten, 1st, and 2nd grades. Informed by research on how young children learn and what motivates them to learn, ABCmouse offers more than 10,000 Learning Activities and 850 lessons encompassing all major academic subject areas, including literacy, math, science, social studies, health, art, and music. ABCmouse Learning Activities are regularly updated to encourage children to explore new content based on studies demonstrating connections between curiosity, exploration, and learning.[4] Additionally, given the research showing relationships between learner choice and learning, ABCmouse offers games, books, puzzles, songs, and videos that children can choose independently based on their interests, as well as lessons on the Step-by-Step Learning Path, a structured curriculum that provides predesignated activities at the child's level.[5] In sum, ABCmouse focuses on making learning fun, fostering children's curiosity, and promoting their confidence as learners, all of which can contribute to children's cognitive and socioemotional development. It can be used on smartphones and tablets as an app, as well as on computers through a web browser. In 2020, more than 10 million children used ABCmouse.

Participants

In March 2020, Age of Learning launched its School Continuity Initiative (SCI) to make its digital learning programs available for free to teachers and families affected by school closures. Through this initiative, more than 825,000 new accounts were created, providing more than 1 million children access to ABCmouse at home. In June 2020, all active users of ABCmouse, including paying subscribers who had completed at least 15 activities in the prior five days, received an email invitation to complete a parent survey and have their children complete a pre-assessment and then a post-assessment in late August/early September. Another email was sent in late August to then-active users, whether or not they had completed the pre-assessment, asking them to complete the parent survey and have their children complete the post-assessment. A total of 6,044 children completed the pre-assessment, and 14,489 completed the post-assessment (ages 2–4.5 = 6,936; ages 4.6–6.5 = 10,869; ages 6.6–9 = 2,581; mean age = 5.19, SD = 1.84). Additionally, 5,990 individuals across the U.S. completed the parent survey (60.5% White/Caucasian; 13.5% Latinx; 10.3% Asian/Asian-American; 6.9% Black/African-American). Approximately 30 percent of the analytic sample had gained access to ABCmouse through the SCI.

Design and Procedures

We used the ABCmouse Assessment Center, a comprehensive suite of standards-aligned, validated digital assessments that measure a wide range of literacy and math skills across preschool, prekindergarten, kindergarten, 1st, and 2nd grades. The Assessment Center includes thousands of online assessment items developed in collaboration with experts at SRI International and NORC at the University of Chicago, and can be used to evaluate a child's learning progress. Table 1 displays the assessed skills.

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4   Wolfe, P. (2006). The role of meaning and emotion in learning. *New Directions for Adult and Continuing Education*, *110*, 35–41.

5   Hirsh-Pasek, K. & Golinkoff, R. M. (2008). Why play = learning. In Tremblay, R.E., Boivin, M., Peters, RDeV, (Eds.) *Encyclopedia on Early Childhood Development* [online], 1–6. Montreal, Quebec: Centre of Excellence for Early Childhood Development and Strategic Knowledge Cluster on Early Child Development.

Table 1. Skills Across Preschool, Prekindergarten, Kindergarten, 1st, and 2nd Grades Assessed Using the ABCmouse Assessments

Literacy	Math
• Picture vocabulary • Upper- and lowercase letter identification • Rhyming words • Beginning and consonant sounds • Replacing sounds in words • Verb tenses • Root words • Singular and plural nouns • Subject-verb agreement • Prefixes and suffixes • Adjectives and adverbs • Reading comprehension	• Recognizing numerals 1–25 • Counting objects 1–20 • Comparing quantities and sizes • Recognizing 2D shapes • Adding numbers up to 100 • Subtracting numbers up to 100 • Comparing numbers • Identifying place values • Reading data and graphs • Partitioning and fractions • Estimating length

Children saw a pop-up window in ABCmouse prompting them to take the appropriate grade-level assessment. Families who completed both the pre- and post-assessments as well as the parent survey received three free months of ABCmouse access.

Among the 6,044 children who completed the pretest and the 14,489 children who completed the posttest, only 349 completed both. Using the data from 20,533 children who completed either a pretest or a posttest, we determined that the reliability coefficients associated with the pretests were .88, .78, .92, .96, .91 across the grades and .89, .94, .95, .91, .93 for the posttests. Then, the data from all 20,533 children who completed either a pretest or a posttest were used in multiple imputation, then deletion (MID), a technique for handling missing data, to estimate the pretest scores of 14,489 children who completed only the post-assessment.[6] The MID method took into account all 20,533 children's demographic characteristics (age, gender, grade); ABCmouse usage (total time spent, total activities completed, total lessons completed, unique days); and all available pretest and posttest scores to estimate the missing pretest scores of 14,140 children. The final analytic sample was the 14,489 children for whom we had posttest data and imputed pretest data.

On average, children used ABCmouse for 53.53 minutes per week (SD = 44.93) and completed 11.75 (SD = 9.49) Learning Activities per week over 10–11 summer weeks.

6 Von Hippel, P.T. (2007). Regression with missing Ys: an improved strategy for analyzing multiply imputed data. *Sociological Methodology.* 37 (1), 83–117. doi:10.1111/j.1467-9531.2007.00180.x

Results

Finding 1. Using ABCmouse for at least 45 minutes and completing 15 Learning Activities across at least three separate days per week can increase learning and minimize summer learning loss.

Examining the relationship between ABCmouse usage and performance, the metrics most significantly related to overall posttest scores (literacy and math combined) were average days of gameplay per week, average activities completed per week, and average time spent per week. Figures 1, 2, and 3 show that using ABCmouse for at least 45 minutes and completing at least 15 activities across at least three unique days per week is associated with greater improvements in key math and literacy skills. In other words, more time spent engaging in ABCmouse is related to higher posttest performance.
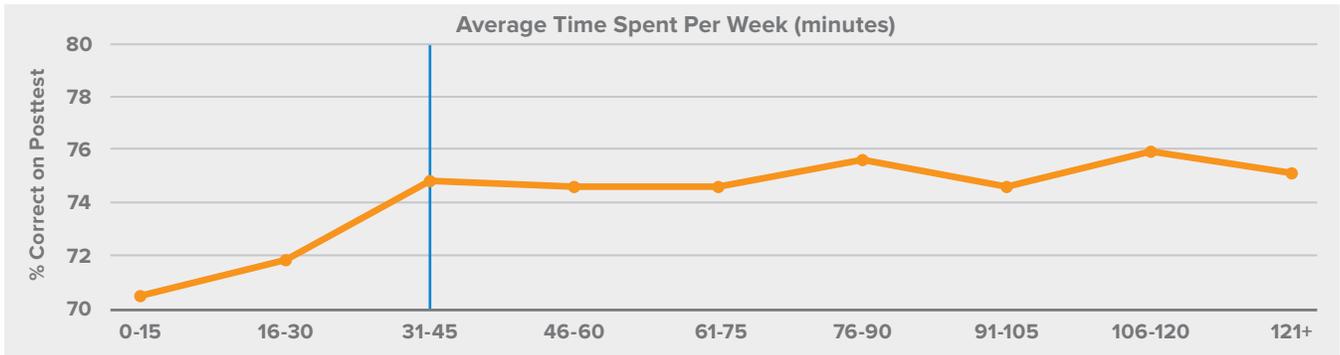

Figure 1. Spending at least 45 minutes on ABCmouse per week is associated with higher posttest performance.
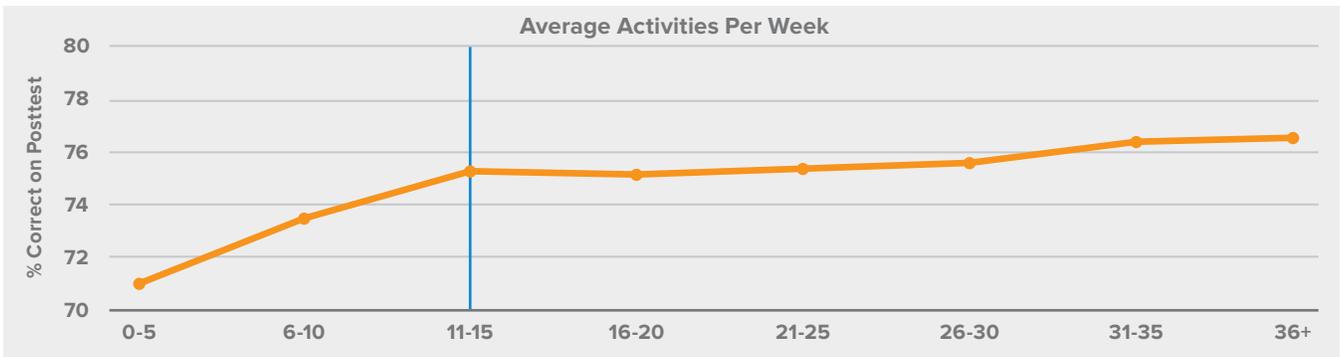

Figure 2. Completing at least 15 Learning Activities on ABCmouse per week is associated with higher posttest performance.
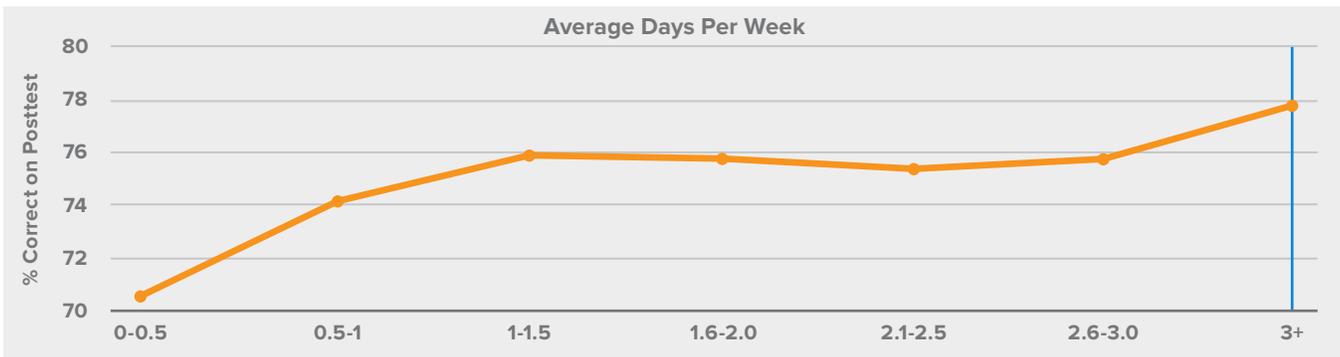

Figure 3. Using ABCmouse for three or more days on average per week is associated with higher posttest performance.

Finding 2. The more children use ABCmouse—whether by completing structured lessons or free play activities—the more they learn.

To better understand children's different learning experiences using ABCmouse, we conducted a latent profile analysis. This was done to identify different groups based on levels of usage as well as completion of structured lessons on the Step-by-Step Learning Path (structured learning) versus completion of Learning Activities in free play areas, where children can choose activities of different types in any order (unstructured learning). The resulting best-fitting model produced four groups, shown in Figure 4. The median weekly usage for each group is displayed in Table 2.
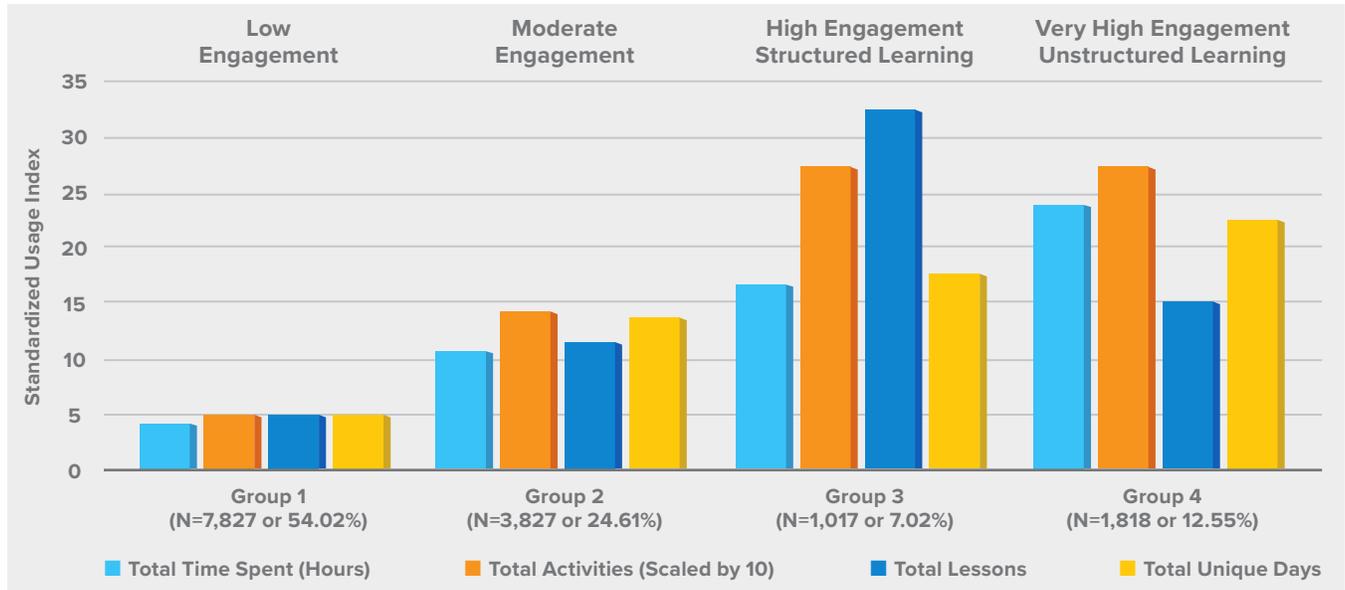

Figure 4. Four groups of children can be distinguished by the amount of usage and by whether they completed lessons or free play activities on ABCmouse.

Table 2. Median Weekly Usage of ABCmouse for Each Group

	Median Time Spent Weekly (minutes)	Median Activities Completed Weekly	Median Days Per Week
Low Engagement	21.13	5	0.38
Moderate Engagement	60.64	13	1.24
High Engagement Structured Learning	95.64	26	1.52
Very High Engagement Unstructured Learning	136.08	25	2.10

Comparing the posttest performance of the four user groups (Figure 5) indicates that greater usage of ABCmouse, whether by completing lessons or free play activities, was associated with a positive impact on posttest performance.
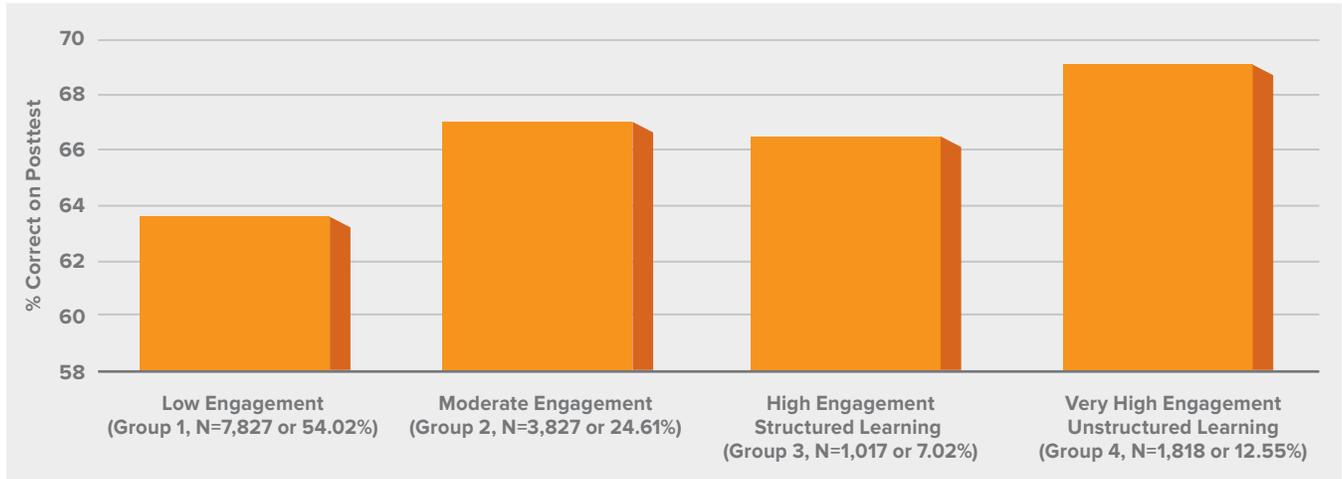

Figure 5. Comparisons of group 1 with the remaining groups show that the more children use ABCmouse, the more they learn, regardless of the type of Learning Activities they complete.

Finding 3. Regular ABCmouse usage can help children of all skill levels, particularly those who start the summer with low skill levels, catch up to their higher-skilled peers by summer's end, closing the gap by up to 87 percent.

We next compared children in the low-engagement group with those in the very high-engagement group. For each child in the very high-engagement group, we identified a counterpart in the low-engagement group who shared similar pretest scores, age, and identical gender, grade, and pretest and posttest form. Then, we weighted the children in each group to establish similarly sized groups. For example, if there was one very high-engaged child matched to three low-engaged children, the very high-engaged child was weighted more heavily to establish a balance between the two groups being compared. The goal was to create two similarly sized groups matched on all observable characteristics except for level of ABCmouse usage.

A weighted regression analysis comparing the low-engagement and very high-engagement groups (Groups 1 and 4) after controlling for age, gender, and pretest performance, showed that the effect of very high engagement with ABCmouse relative to low engagement is related to an increase of 4.35 percent on the posttest. This statistically significant result represents an effect size of 0.2 (Figure 6).
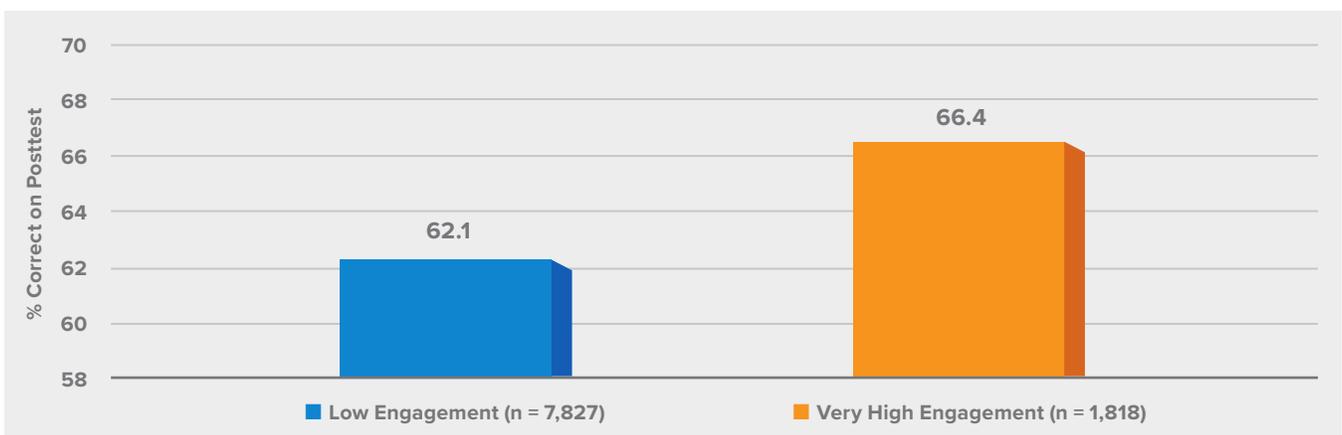

Figure 6. The effect of greater ABCmouse usage during the summer is a statistically significant 4.35 percent boost on the posttest.

We then compared the pretest and posttest performance of the low-engaged and very high-engaged children across initial performance on the pretest, as shown in Figure 7. Regular, consistent use of ABCmouse benefited all children, regardless of their skill level at the start of the summer.
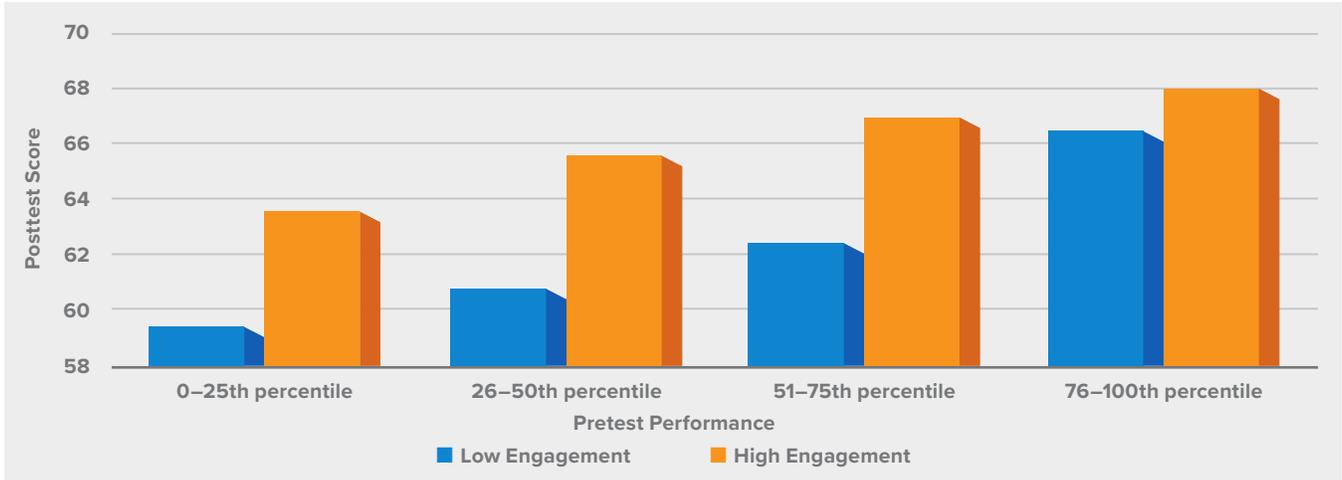

Figure 7. Regular ABCmouse usage helps children across all skill levels.

Among children with high prior knowledge, posttest scores increased from 64.2 to 67.9 percent, representing an increase rate of 5.8 percent [(67.92-64.18)/64.18 = .058]. Among children with low prior knowledge, posttest scores increased from 59.2 to 63.5 percent, which represents a higher increase rate of 7.2 percent [(63.52-59.23)/59.23 = .072]. In particular, with greater, consistent ABCmouse usage, children who started the summer with low prior knowledge caught up with their peers with high prior knowledge (but with low engagement), closing the performance gap between the groups by up to 87 percent [1-(64.18-63.52)/(66-61) = .868], as shown in Figure 8.
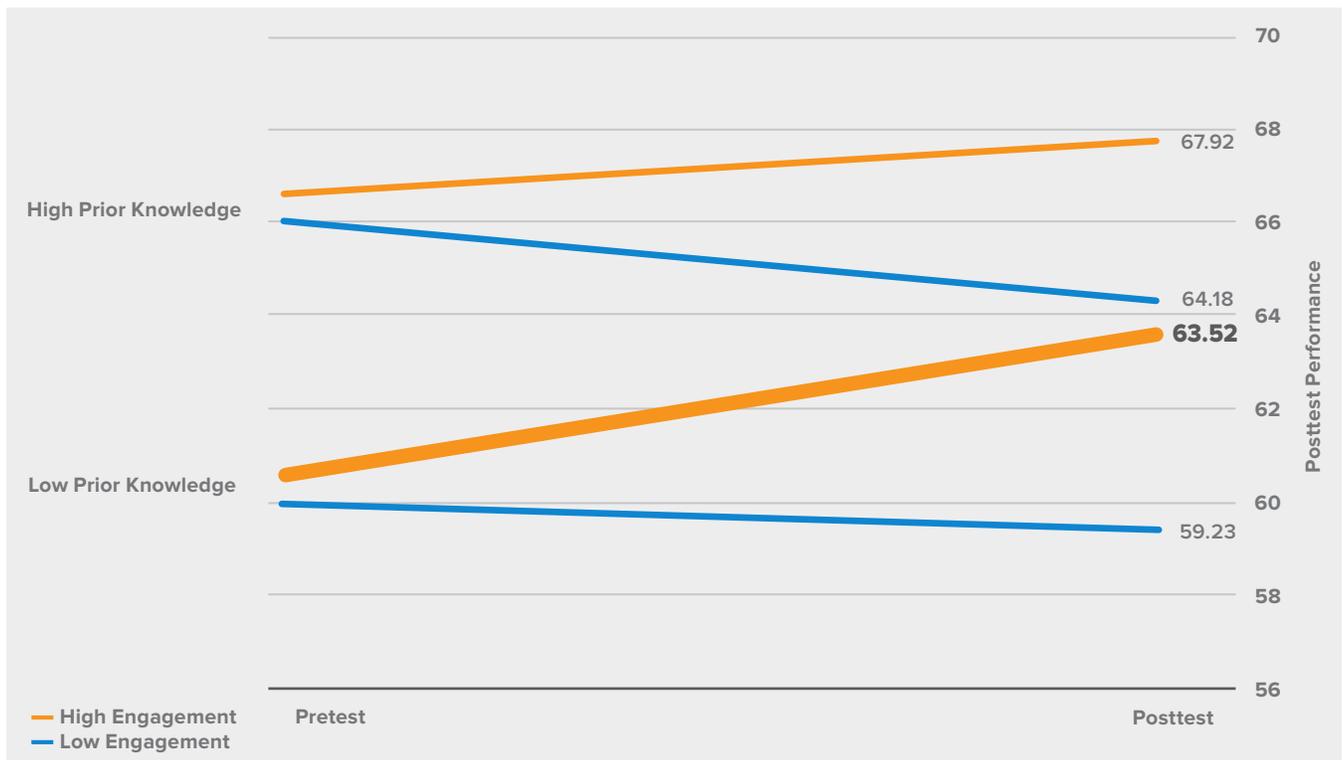

Figure 8. Low engagement with ABCmouse is associated with summer learning loss, while high engagement is associated with learning gains.

Finding 4. More than 80 percent of parents reported that since using ABCmouse, their children were more motivated to learn and were more independent in completing Learning Activities.

Of the 5,990 parents of who completed the survey, 84 percent indicated that since using ABCmouse, their children have become more independent in completing Learning Activities (Figure 9). Additionally, 82 percent indicated that their children were more motivated to learn about the topics they saw on ABCmouse. This is noteworthy, considering the challenges many children experienced in staying interested in schoolwork in the absence of the social interactions and structure provided by in-person schooling.
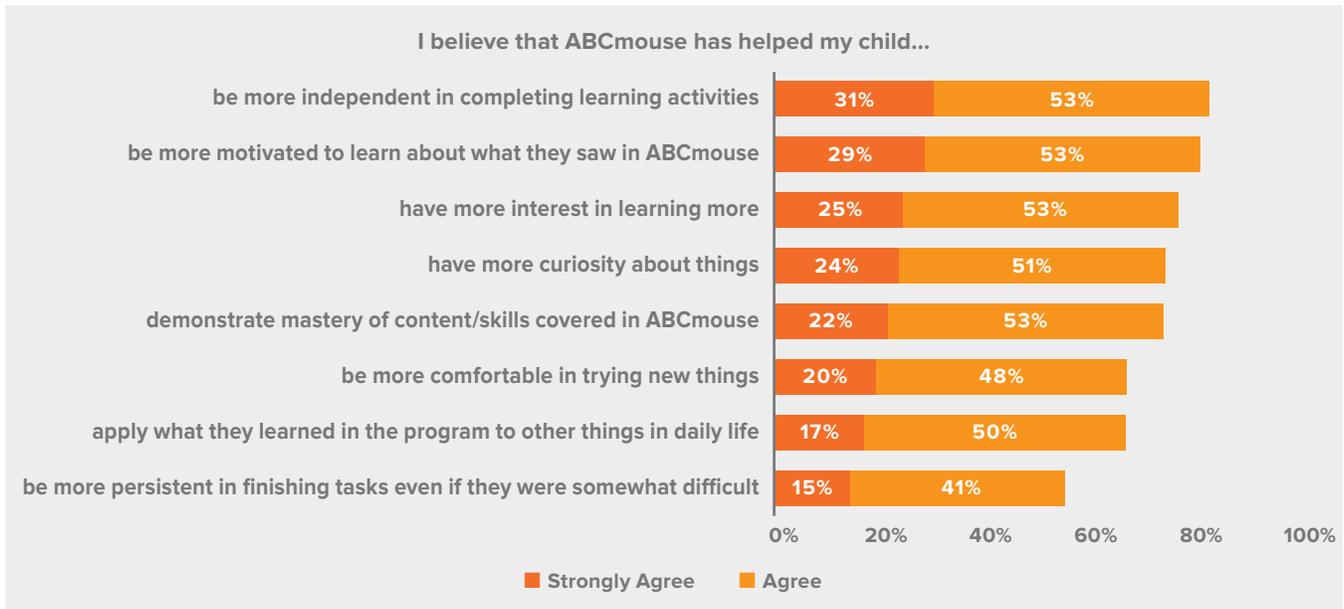

I believe that ABCmouse has helped my child...

Statement	Strongly Agree	Agree
be more independent in completing learning activities	31%	53%
be more motivated to learn about what they saw in ABCmouse	29%	53%
have more interest in learning more	25%	53%
have more curiosity about things	24%	51%
demonstrate mastery of content/skills covered in ABCmouse	22%	53%
be more comfortable in trying new things	20%	48%
apply what they learned in the program to other things in daily life	17%	50%
be more persistent in finishing tasks even if they were somewhat difficult	15%	41%

■ Strongly Agree ■ Agree

Figure 9. A majority of parents indicated that ABCmouse had a positive impact on their children's learning behaviors.

Conclusion

This study, the first independently funded efficacy evaluation of ABCmouse, included large numbers of children across all ages for whom the product was designed. The results showed that using ABCmouse consistently over 10–11 weeks—whether by completing structured lessons or unstructured free play activities—is associated with significant increases in summer learning, suggesting that ABCmouse is a promising resource to mitigate summer learning loss. ABCmouse usage benefited children of all skill levels. But the effects were especially noteworthy for those who started out with low skill levels and could catch up to their peers with higher skill levels through regular, consistent usage of ABCmouse, substantially closing the performance gap. Parents also valued ABCmouse's engaging educational content that motivated their children to continue learning at home while becoming more comfortable and confident about using technology and developing greater independence and curiosity to explore new topics. In sum, this study highlights the educational value of ABCmouse as a program that helps children continue learning outside of school while enjoying the learning experience.