Differentiating Instruction with Educational Technology in Early Elementary

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Educational technology expands the opportunities for teachers to differentiate instruction for all students. Teachers use websites, software, or educational apps to deliver whole group instruction and to provide small groups with direct instruction for the opportunity to practice specific skills. Digital resources can also support individual discovery and guided instruction. The goal for differentiation is to provide challenging material for those who have achieved mastery, basic content for those who are struggling, and engaging repetition for those who need practice. As educational technology has evolved as a resource for learning, teachers are increasingly integrating it into their weekly routines to reach every student at his/her individualized starting point and to facilitate learning at a developmentally appropriate pace (Parette, Quesenberry, & Blum, 2010).

An important criteria in the selection of a specific digital resource is its proven efficacy to support the skill development and knowledge acquisition that is measured with standardized tests, ongoing assessments, and informal observations. However, the academic, peer-reviewed literature is sparse in reporting the efficacy of specific educational technology products. This paper provides a summmary of the efficacy research conducted with ABCmouse, a leading educational technology product used in more than 65,000 classrooms and in more than one million homes with younger students. ABCmouse was chosen for the following reasons: 1) the authors are employed by the parent company that creates ABCmouse and were able to access extensive back-end data for analyses conducted by independent research partners, 2) rigorous

efficacy studies, including multiple randomized controlled trials, were completed or are in progress using ABCmouse, 3) it is available as a free, online supplemental teaching resource for teachers, 4) ABCmouse is a comprehensive digital early learning resource for children ages 2–8, and 5) it offers several pathways to differentiate instruction. Additional information for the research in this paper is available at http://www.ageoflearning.com/research.

<u>ABCmouse in Prekindergarten Classrooms</u>

Two consecutive studies with different designs were conducted over a two-year period to examine the efficacy of ABCmouse as a supplemental learning resource to remediate the risk of school failure and support academic growth in kindergarten (Thai & Ponciano, 2016). In Study 1, prekindergarten teachers integrated ABCmouse into their instruction naturalistically. This district prekindergarten program enrolled students who had been assessed with the Early Prevention of School Failure (EPSF) and identified as at risk for school failure. The study examined differences in the EPSF scores for a diverse sample of 230 children in 12 classrooms at the beginning and at the end of the school year based on the natural variation of ABCmouse usage to determine if ABCmouse independently contributed to growth in scores on the EPSF (higher scores indicate a decreased risk of failure in kindergarten). During the school year, the prekindergarten students completed between 0–551 ABCmouse activities (median = 35).

Analyses confirmed that the number of ABCmouse learning activities completed was a significant predictor of EPSF growth. The lower the students scored on the pretest, the stronger the growth, depending on the number of activities completed. While there was no significant difference in their pretest EPSF scores, the students who completed at least 35 learning activities individually experienced significantly higher growth (an additional 65% gain; effect

size = .47) on the EPSF compared to those who completed fewer than 35 activities. Study 1

supports the potential of ABCmouse to help prepare struggling students for a successful

experience in kindergarten. Study 2 examined whether this growth continued throughout the

kindergarten school year for these students and whether the use of ABCmouse in kindergarten

could be linked to growth for students of all academic abilities.

<u>ABCmouse in Kindergarten Classrooms</u>

In the second year of this study (Study 2), 210 of the prekindergarten students

participated along with 361 students who were not enrolled in the district prekindergarten.

They entered kindergarten together into 33 classrooms across two elementary schools. With a

quasi-experimental design, the kindergarten classrooms in two elementary schools received full

access to ABCmouse for all students for the school year (Full-access group). The kindergarten

classrooms in two other elementary schools received restricted access to literacy and full access

to math learning activities in ABCmouse for the first half of the school year and full access to

the entire ABCmouse curriculum for the second half of the year (Restricted-access group).

Students were assessed in literacy and math with the STAR Early Literacy and Early Numeracy

and Classworks Reading and Math assessments three times during the school year. The

Dynamic Indicators of Basic Early Literacy Skills (DIBELS) was administered only in the spring.

Students completed between 0–5,266 ABCmouse learning activities over the school year with

an average of 390 activities. The Full-access group averaged more than three times as many

reading activities as the Restricted-access group in the first half of the school year (Full-access =

223, Restricted-access = 69). During the second half of the school year, when both groups had

full access, they completed a similar number of learning activities (Full-access = 302, Restricted-

access = 304). The results for all assessments and time points are available at
www.ageoflearning.com/research.

Overall, during the first half of the school year, kindergarten students in the Full-access group who had regular usage of ABCmouse achieved 120% greater gains on the Classworks Reading and 150% greater gains on Classworks Math than the students in the Restricted-access group who had limited usage of ABCmouse. While students in the district prekindergarten program started kindergarten with higher scores on the STAR Early Literacy and Math than the other kindergarten students, with regular access to the full ABCmouse curriculum those who were not in the district prekindergarten program were able to catch up with their higher-scoring peers on both literacy and math by the end of the school year in both academic domains. Effect sizes in this study ranged from .23 to .66. Study 2 demonstrated the continued success in kindergarten for students who were initially thought to be at risk for failure as well as the benefits of full access to the ABCmouse curriculum for all students.

<u>ABCmouse at Home for Kindergarten Students</u>

This randomized controlled trial compared the DIBELS and Curriculum Based Measurement (CBM) scores of a nationally representative sample of kindergarten students at four time points. Of the 281 participants, 128 who were randomly assigned to use ABCmouse at home (treatment group) met the 45 minutes per week usage goal requirement for 13 weeks. Overall, children in the treatment group achieved 25% higher growth in early literacy than children in the control group who did not use ABCmouse (effect size = .30). Treatment group children with lower scores (below the median) at pretest achieved 33% higher scores in literacy and 48% higher scores in math compared to similarly scoring peers in the control group (effect

size = .38 for literacy and .49 for math). The benefit of utilizing an educational resource at home is highlighted in this study. Teachers who assign free learning activities for students to complete at home increase the benefits of using ABCmouse in the classroom for students who are at and below grade levels.

### ABCmouse at Home for Rising First Graders

Rising first graders were randomly assigned to use ABCmouse over the summer break to test the impact of ABCmouse in preventing the loss of previously learned content, often referred to as summer slide. End-of-year kindergarten i-Ready and Stanford Achievement Test (SAT) assessments and beginning-of-year first grade i-Ready assessments were collected from the district and compared. Full access to ABCmouse was provided to participants for 12 weeks over the summer break and was found to prevent summer slide in literacy for those students who completed at least 200 learning activities, approximating the benefits of one month of instruction (effect size = .13). For these students, the more they used ABCmouse, the greater their reading gains. The results from this study underline the importance of facilitating the use of effective supplemental learning resources over the summer to help students retain important skills and knowledge between school years.

### Kindergarten Case Study: Laura Bryant

Laura Bryant is a kindergarten teacher in a low-income community in New Mexico. Her students all qualify for the free breakfast program, and 90 percent qualify for free or reduced lunch. She knows they are at high risk for school failure when they first come into her classroom. The challenge lies in meeting the diverse learning needs of her students, including a range of English Language Learning (ELL) needs. "I have students who already know [how to

spell] their name and their letters, but then I have ones who don't know their letters or their sounds."

Laura employed a three-pronged, diferentiated teaching strategy to 1) engage students with fun and diverse learning activities; 2) provide individualized lessons for below-, at-, and above-grade-level students; and 3) vary the delivery and mode of instruction for students to learn individually, in small groups, and with the entire class. Additionally, she discovered that ABCmouse was a valuable ELL resource for the students in her class who primarily spoke Spanish.

The wide range of ABCmouse learning activities provided each student with something to engage them in learning, based on their individual interests. Laura discovered thousands of activities to reinforce the important skills and concepts that she teaches, through books, games, puzzles, art, and music videos that appeal to diferent types of learners. As a result, she increased student engagement and focus, which led to important gains in academic skills: "One hundred percent of my class made significant improvement beyond expectations after using ABCmouse. I've never seen a group of kids that are all reading, writing, adding, and subtracting by the end of kindergarten. They know what the sounds are. They know what their letters are. They know what their numbers are; they can count forwards and backwards all the way to 100."

Each year, Laura finds that she has students who need a highly individualized approach to learning. One such student was a boy who had witnessed domestic violence and was placed in foster care. This student had an Individualized Education Plan (IEP) to help him learn while coping with attention deficit hyperactivity disorder (ADHD) and behavioral challenges. He was

introduced to ABCmouse with the rest of the class: "He loved it! I was able to get a good 30 minutes of attention from him, with him working, staying on task, and focusing. He knew that if he listened, learned, and behaved for at least the first 10–15 minutes of the whole group lesson, that he would be able to use ABCmouse. At the end of the year, he was near proficiency and missed the benchmark for reading by only one or two words. He could sound and blend, and he could count. He had his one-to-one correspondence."

Another struggling student in Laura's classroom benefited from a highly individualized curriculum using ABCmouse; it helped her learn to speak and read English, which was not her first language: "When school first started, I had a student who had no reading skills whatsoever. When I finished testing at the end of the year, not only did she know all her letters in order and out of order, but she was reading 169 words per minute. In order for her to go to first grade, she had to read a minimum of 25 words per minute with fluency."

In addition to using ABCmouse as a supplementary resource for children below grade level, Laura found it had a positive impact on advanced students, too. She describes how one gifted child was able to use ABCmouse for more challenging reading while remaining in the classroom with his same-aged peers: "He would say, 'I'm gonna go to the challenging part.' He liked to go to the folk and fairy tale section to practice his reading. My kids, once they take off on it, they figure out how to change and adjust things. In this case, he was reading at a second-grade level, and in the middle of the year he figured out how to turn off the speaker and the highlighting because he wanted to try and read it by himself."

Within her classroom, Laura successfully met the needs of her most at-risk students and her most advanced students with the same educational resource. "When they're on the low

end, I can assign lessons and activities that will help them; if I have a higher student who already knows sounds and letters, I can assign a completely diferent lesson for a challenge."

Laura often used ABCmouse learning activities to demonstrate a concept or skill to her students during whole-class instruction. Then, as they worked in centers, students had the opportunity to reinforce those skills individually or in small groups through more ABCmouse activities: "I do my whole group lesson for about 15 to 20 minutes. After that are centers where I can teach in small groups. One of those centers is always ABCmouse for 15- to 18-minute rotations. So they have 18 minutes in the morning, 18 minutes at lunchtime, and 18 minutes in the afternoon. Mondays, Wednesdays, and Thursdays they have assigned, specific activities to complete. On Fridays, they complete one activity and then can explore."

Laura found that the diverse activities in ABCmouse enable an engaging and interactive experience that can be delivered to her students in various groupings to teach key concepts. For example, she introduced the letter "A" with a music video on ABCmouse to the entire class: "On ABCmouse, I would click on the letter 'A,' and then the visual learners have an example of the 'A.' And some kids like to dance, so I let them dance to the music. Some of them use the hand movement that we learned in class for the 'A' sound." After the whole-group instruction, students sat at the computers during center time and reinforced their understanding by completing ABCmouse games, puzzles, books, and art related to the letter "A" and the sounds that it stands for. And for any student that needed additional assistance, Laura assigned specific activities at the student's appropriate level to be completed individually in class or at home.

Kindergarten Case Study: Julie Choudhary

Julie Choudhary, a 25-year-veteran kindergarten teacher, returned to her hometown of Escondido, California, to teach in the public schools in 2002 because of her commitment to the community. Escondido is a city of 150,000 in inland Southern California; its population is approximately 50% Latino, with a significantly lower median household income and higher poverty rate than the rest of the state. Julie's students are primarily from low-income families and learn English in her classroom.

Julie introduced ABCmouse to her class primarily as a language model. "It was fascinating. I would have students who were almost non-verbal using scientific or social studies words that I wouldn't think a five-year-old would use." She assigned every child an individualized lesson on ABCmouse each day, according to the areas of need indicated by a standardized assessment administered at the beginning of the year. "They have to do one complete lesson every day. And then they're allowed to go to their virtual bedroom or their hamster on ABCmouse.com and to use their tickets and go shopping. Because that's exciting to the children . . . ."

Julie discovered that she could differentiate her instruction with ABCmouse's Lesson Builder, which allowed her to select and assign specific learning activities for individual students, groups of students, or the entire class. Julie attributed her students' success on the end-of-year assessments to her ability—using ABCmouse—to meet their individual academic needs. "As in any class, you have students that are at different levels. So, I'll have a group lesson where maybe students are working on subtraction at the beginning of the year. Or, I'll have a whole-group lesson where students are working on a sight word or a word family. It just

really depends on what the concept is that I am working on. I'll look at the DIBELS assessment data and I'll go to the Lesson Builder and I'll pull [activities related to] those concepts into a student's file."

Julie was surprised by the impact of the website on her students' achievement. "Their letter naming fluency and their concept of sound fluency increased significantly as the year went on." Overall, Julie's class improved by more than 50% on multiple early reading skills from the middle to the end of the year, with most of her students at least doubling their scores on one or more skills.

Julie's use of ABCmouse to differentiate instruction contributed to further positive outcomes for her students. At the beginning of the school year, 32% of her students were significantly below benchmark in literacy; by the end of the year, only 9% were in that category. And Julie's students' gains from the middle to the end of the year on key literacy skills were more than twice the national average.

## Conclusions

The research described in this paper provides evidence that students learn important foundational skills with the supplemental use of ABCmouse in the classroom and at home. The case studies illustrate the pedagogical strategies kindergarten teachers can use to facilitate differentiated instruction with ABCmouse. With the abundance of technology that is available today (U.S. Department of Education, National Center for Education Statistics, 2016), knowledge of successful pedagogical strategies to integrate digital resources and to differentiate instruction is highly relevant in contemporary classrooms. Research has found that

the majority of the general public feels students should spend approximately one-third of their school day using technology (Horn & Peterson, 2016).

We propose that educational technology, specifically ABCmouse as a supplemental resource, provides unique benefits beyond those of traditional resources used to differentiate instruction for younger students.  ABCmouse contains a rich variety of learning activities that are organized into levels for differentiation and adds new content seamlessly without changes to the classroom environment, instruction, or lesson planning. Comparatively, traditional (non-digital) supplemental resources for differentiating instruction often require classroom storage space and replacement when new versions are developed. ABCmouse offers numerous points of entry to address a skill or concept. A video or animation can introduce the concept; a song or book can reinforce related vocabulary terms; and a game can provide entertaining practice. Teachers choose the most appropriate delivery, or point of entry for students who have varying learning preferences with one educational tool.  Traditional resources are typically more limited in format and delivery (workbook, story books, etc.).

Traditionally, teachers often divide students into ability categories within the classroom and distribute different materials designated as appropriate for each group in order to meet individual needs. Unfortunately, students frequently intuit their level in comparison to their peers despite all attempts to mask that the red group is more advanced than the green group, which can contribute to reduced motivation (Boaler, 2005). With ABCmouse, students can be placed at individualized levels by teachers and when they interact with their peers and discuss their experience with specific activities, they are unaware that their level may differ.

As stated on Edutopia.org, "Technology has opened the doors for teachers to provide DI without feeling overwhelmed" (Stern, 2015). ABCmouse eases lesson preparation with search features that rapidly identify an extensive number of activities to support an academic need. ABCmouse also provides teachers with pre-designed lessons and a user-friendly system for creating individualized or group lessons. Wolf (2012) emphasizes that technology supports teachers in developing personalized learning experiences for more students at any given time. With the wide range of student needs, the ever-expanding demands on teachers' time, and the need for accountability, research-based evidence for effective tools to facilitate academic progress for every student to achieve grade-level objectives is in demand. The extensive and rigorous portfolio of research demonstrating the efficacy of ABCmouse sets a standard for all educational technology resources.

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