

***OrCam Read, an Assistive Technology Device to increase Access to Reading for Students with Dyslexia, a short term outcome study for 7 Students with Dyslexia that utilized a personal text to speech device.***  
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OrCam Read, an Assistive Technology Device to increase Access to Reading for Students with Dyslexia, a short term outcome study for 7 Students with Dyslexia that utilized a personal text to speech device.

**Background:** Children with Dyslexia often have significantly less independent reading experiences, negative perception of reading and reduced access to reading age and grade level materials for leisure and academic contexts. Technology assisted reading experiences, paired with Dyslexia intervention at regular intervals was targeted to improve subjective and objective reading outcomes of children with a diagnosis of Dyslexia. The study objective was to measure the reading outcomes of assistive technology aided experiences in children with Dyslexia, using the OrCam Read over a 10 week trial.

**Methods:** Children aged 7 to 15yrs, diagnosed with Dyslexia and identified as having Mild to Severe Reading delays, were enrolled in a 10 week trial use of the OrCam Read Outcomes reported included subjective measures of increased independent reading habits, measured in hours per day of reading and types of reading material, identified features of the OrCam Read that were beneficial for use, and subjective overall increased pleasure in reading independently. A pre and post measure of Oral Reading skills (Fluency, Rate, Accuracy and Reading Comprehension) also assessed objective progress in their Dyslexia therapy program, while paired with the OrCam Read device for independent reading.

**Results:** Analysis focused on 7 children who volunteered to participate and were already enrolled in a Dyslexia Therapy program. Initial testing, with the Gray Oral Reading Test 5 (GORT 5) had been completed within 3 months of the onset of the study, identifying a Mild, Moderate or Severe Reading Delay. Over the course of 10 weeks, the children's parents reported their daily reading habits (google form survey submitted weekly), the features of the OrCam Read they found helpful, and the perception of their experience with the OrCam read and its helpfulness in access to reading full page (connected text) in leisure and academic reading experiences.

**Conclusions:** Providing assistive technology to access grade level academic reading material and age appropriate leisure reading material, typically challenging and inaccessible to children with Dyslexia, while actively enrolled in a Dyslexia therapy program, increased independent reading experiences, positive reading experiences and encouraged leisure reading. Pairing a text to speech reading device, such as the OrCam Read, with an active therapeutic program for remediating a reading delay, can increase quality of reading experiences and promote independent reading of age and grade level text, in children with Dyslexia, with an overall goal of improving lifelong literacy outcomes.

The COVID experience for learning, for our students with Specific Learning Disabilities in Reading and a medical diagnosis of Dyslexia has been challenging, and stressful. The same communication platforms that many students are utilizing for access to their school are proving to be the barrier of learning for our students with disabilities, who lack automaticity with reading and spelling.. Whether using Google Meet or Zoom, chats, instant message and power points, use of online Reading platforms, and virtual learning environments; these all require a student to have intact independent reading and writing skills. OrCam partnered with Therapy and Education Connections PLLC, to allow our clients with Dyslexia to participate in a free, short term (10 week) trial of the OrCam Read. Measures of perception of Reading ability, Access to Reading, Device Features, Length of time to become efficient in use of the device, “click and read” ease of use, and measure of length of leisure or academic reading was reported throughout the trial. Pre-device use measures of Reading level were measured by connected reading fluency (Gray Oral Reading Test), single word reading and decoding (Boder Test of Reading and Spelling), vocabulary (Picture Peabody Vocabulary Test), and Phonological Awareness (Comprehensive Test of Phonological Processes). All participants had a formal diagnosis of Dyslexia, although their age, and severity of disability was variable. Each student received 1-2 sessions/week of Dyslexia therapy throughout the trial. The intent was to trial the device across home and school settings. However due to COVID 19 related school closures, none of the students enrolled had a consistent opportunity to use the device outside of their home environment.

Academic learning is the path to success in adulthood. The ability of a student to read and write, is specifically correlated to academic success. Access to reading (grade level content, pleasure reading and functional reading), for students with Dyslexia, who have intact, average intellectual ability, is the opportunity to have similar reading experiences as their same age and grade level peers. OrCam developed a tool to provide this access for students with low vision, reading disabilities and Dyslexia, following a successful launch of the MyEye, an assistive technology device for the blind and visually impaired. Their team of sales, marketing and research staff inspired our participation in the use of the OrCam Read, and aligned with our clinic’s goal, to increase access and reading skills to all socioeconomic populations. COVID has proved to have increased the barriers for our students, and this was a wonderful opportunity to alleviate the learning challenges, and measure the progress of our students, with weekly subjective feedback from the children and families, as well as objective, standardized assessment measures in reading fluency, accuracy, rate and reading comprehension.

***By, IDA definition, “Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.”***

**The Participants** - Each of the 7 clients enrolled in the long term trial had a diagnosis of Dyslexia, following administration of a comprehensive standardized assessment battery, and confirmation of medical diagnosis in collaboration with a Speech Language Pathologist and each child's Pediatrician. The children included, ranged in age from 7 yrs to 15yrs. Each student had different educational opportunities, throughout the trial, from online school platforms, homeschool, to in-person learning, due to the transitions associated with COVID 19 school closures.

<b>Student</b>	<b>Age at close of study</b>	<b>Grade/school environment</b>	<b>Diagnosis, Comorbidities</b>	<b>Participation Length</b>	<b>Reading Level at onset of study, GORT-5 ORQ (Avg 90-110)</b>
Student 1	11 yrs	6th Homeschool and half day private school	Dyslexia, CAPD, ADHD	12 weeks	ORQ= 86
Student 2	15 yrs	8th Public school (hybrid model of telehealth and in person)	Dyslexia, Autism	10 weeks	ORQ= 52 Unable to read connected text
Student 3	9 yrs	3rd Homeschooled	Dyslexia, ADHD	10 weeks	ORQ = 76
Student 4	11 yrs	5th Private School Full time	Dyslexia, ADHD	10 weeks	ORQ = 81
Student 5	11 yrs	6th Homeschooled	Dyslexia	10 weeks	ORQ= 81
Student 6	7 yrs	1st Public Charter School (hybrid model of telehealth and in person)	Dyslexia, CACC	10 weeks	ORQ = 52, unable to read connected text
Student 7	13 yrs	7th Public Charter (hybrid model of telehealth and in person)	Dyslexia, High Functioning Autism	10 weeks	ORQ = 52 Unable to read connected text

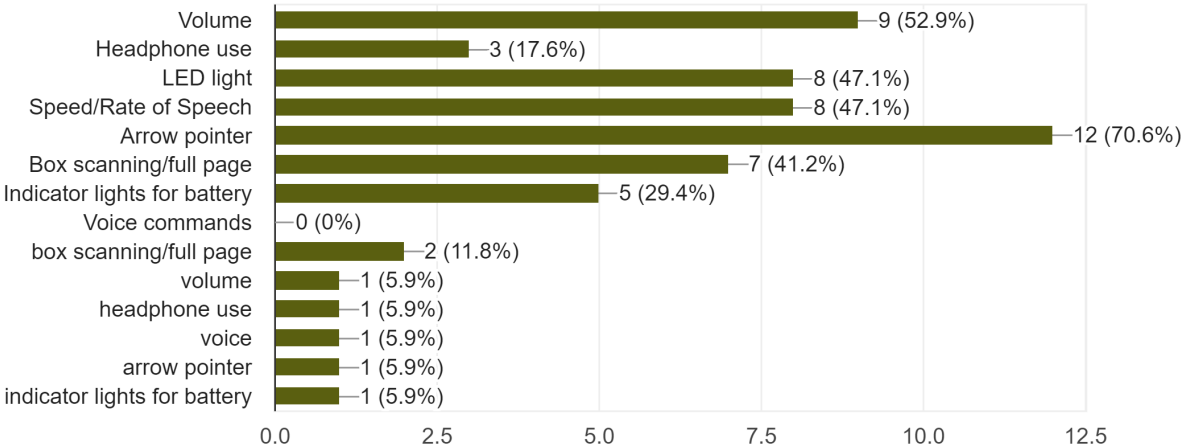


**The Device** - The OrCam Read, is a hand held reading tool, based on camera technology, that captures any image of text, and provides a text to speech conversion of written language. It is approximately the size of a large white board marker, with features that include modern USB charging capabilities, bluetooth headphone access, volume and rate control, and even built in, LED lighting features for evening reading. It provides the ability to scan and read aloud an entire page of connected text to the user. Users are able to utilize either a point cursor or a highlight box, to identify where on the text the device should begin reading aloud. This tool is unique in its ability to provide a connected

listening experience, of grade level text to users with Dyslexia. Each study participant provided feedback on the ease of use, the length of time each became comfortable and efficient with use, the “point, click and read,” use and the overall increase in leisure reading, as a result of the use of the device.

**Device Features Feedback Reported**

Which features did you find most relevant?  
17 responses



**Feedback received**-The device features which were determined to be the most relevant, increased over the trial period with the most important feature, the “arrow pointer,” which allows users to identify a specific starting point in the text. Other features noted to hold relevance to the users included volume and rate control (plus and minus buttons on the top of the device), and an LED light for reading in low light conditions, such as in bed at night, or in a car.

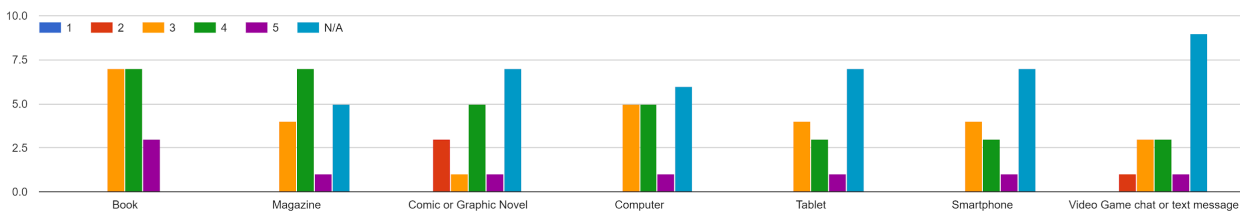
<b>Student</b>	<b>Preferred Type of Media to use with the OrCam Read</b>	<b>Overall Perception of the Use of OrCam Read</b>
Student 1	Books	Great Tool, asked to keep it longer past the trial.
Student 2	Books	Enjoyed informational text use.
Student 3	Books	Decided reading had improved so much that a full page text reader was not necessary.
Student 4	Books/Graphic Novels	Great Tool, kept the device. Enjoyed “pointer” and “box, full page text, “reading.
Student 5	Books	Huge progress in enjoying reading and listening to read aloud, were amazed with the technology and kept the device after the trial.
Student 6	Books	Decided children’s books with a single line of print or divided print did not work functionally with the device for a young child. Impressed with the quality and technology, and interested for use when the child progresses to chapter books.
Student 7	Books	Encouraged him to read . Prior to the device, he did not engage in any leisure reading. Excited about it throughout the trial. Kept the device following the trial. Enjoyed “click” and it reads aloud to you.

## Positive comments reported during the study.

- The ability to read a large paragraph all at once. The simplicity and size of the device were great.
- Helps my dyslexic 6 yr old son.
- Able to read on my own.
- it's great in the box mode.
- Liked being able to use both broad and more specific versions to read full texts and identify specific words.
- Comprehension aid.
- Comprehension aid and positivity of reading reinforcement. \_\_\_ gets a big smile when he has read everything right and the OrCam verifies it. Also on days he is stressed, I let him have the device do the reading.
- It was easy to use, not complicated. It got almost all the words right, only got mixed up a few times. I only tried it on books but was excited to hear it can work on computers and phones too.
- My child is motivated to use it.
- Helps \_\_\_ improve comprehension by ensuring that he is reading words correctly. He actually wants to read now because he thinks the OrCam is cool.
- Aides in double-checking my reading and also helps me read words I am not sure of.
- The excitement of \_\_\_ being able to read what he wants.

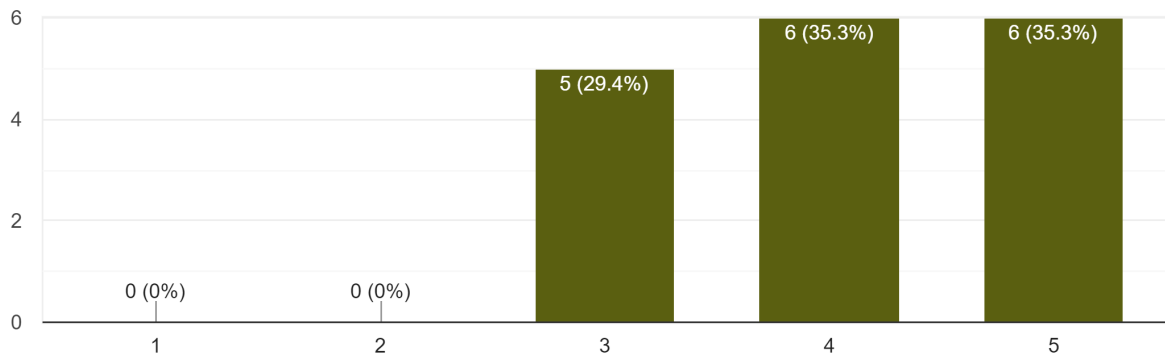
## Different types of media accessed by the participants and reported during the trial.

How satisfied were you with the use of different types of media?



How satisfied were you with the Orcam Read?

17 responses



Each study participant found relevant use, and with continued participation, they gained increased use of the device, and increased media access across types of reading; books, magazines, computers. Satisfaction also improved as the users gained experience with use.

### Pre and Post use Outcomes for Improved Fluency, Accuracy and Comprehension

The Gray Oral Reading Test 5 (GORT-5) was administered, along with a Dyslexia battery of tests, before the onset of the trial, with each of the participants. Significant increase in reading fluency, and overall Oral Reading Quotient (ORQ) was measured.

Student	Baseline (ORQ, Avg. 90-110)	Final (ORQ, Avg. 90-110)
Student 1	ORQ= 86	ORQ= 86
Student 2	ORQ= 52 Unable to read connected text	ORQ = 52 Unable to read connected text
Student 3	ORQ = 76	ORQ= 86
Student 4	ORQ = 81	ORQ =89
Student 5	ORQ= 81	ORQ= 84
Student 6	ORQ = 52, unable to read connected text	ORQ = 68, read 12 of the words independently, and gained comprehension.
Student 7	ORQ = 52 Unable to read connected text	ORQ = 52 Unable to read connected text

**For Student 1, the ORQ was maintained from the onset to the conclusion of the study.**

**For Student 3, the ORQ improved from 76 to 86.**

**For Student 4, the ORQ improved from 81 to 89.**

**For Student 5, the ORQ improved from 81 to 84.**

**For Student 6, the ORQ improved from 52 to 68.**

Overall, one student maintained their performance as they increased in age. Four students made significant improvements in Reading Rate, Accuracy, Fluency and Comprehension, with a measurable Quotient increase from the onset to the conclusion of the study. It can be correlated, that a Dyslexia Therapeutic program, when paired with independent reading experiences with use of the OrCam read, results in measurable increases in Reading Efficiency for connected text.

### **Conclusions:**

Users of the OrCam Read were able to develop independent reading opportunities and gained access to grade level content and leisure reading of connected text. Leisure reading increased from a level of no independent reading to one hour per day. The students gained efficient independent use, learned the device features, and increased the type of media accessed over the term of the trial. The OrCam Read allowed full page text to speech access, which is not possible across different types of media, with any other assistive technology device.

The study participants reported the OrCam Read was a vital part to their positive experience in learning to read and decode, when paired with a Dyslexia intervention program and when having device support on a regular basis at the onset of use. After 3 weeks of use and support in use, the study participants reported increased ease of use, and longer independent reading to one hour per day. "Aim and Click," with the pointer tool or box highlighter, was indicated to be a relevant feature by week 4 of the trial.

Providing assistive technology to access grade level academic reading material and age appropriate leisure reading material, typically challenging and inaccessible to children with Dyslexia, while actively enrolled in a Dyslexia therapy program, increased independent reading experiences, positive reading experiences and encouraged leisure reading. 5 of the 7 participants indicated high success and enjoyment with use of the device, with increased leisure reading to approximately 1 hr per day. 2 of the 7 study participants reported an amazing experience, and were finally able to enjoy leisure reading of novels and books, for the first time in their lives. Connected reading of a full page of text is a unique feature of the OrCam read, and books were noted to be the most likely reported media.

Reading Efficiency, of orally read passages on the Gray Oral Reading Test 5th Edition (GORT), as measured by individual Fluency, Accuracy and Comprehension skills and overall Oral Reading Quotient (ORQ), maintained for one student, at ORQ= 86 and measurably improved in four of the study participants.



Pairing a text to speech reading device, such as the OrCam Read, with an active therapeutic program for remediating a reading delay, can increase quality of reading experiences and promote independent reading of age and grade level text, in children with Dyslexia, with an overall goal of improving lifelong literacy outcomes. Even when achieving functional reading, students with Dyslexia often lack stamina in connected text, and a tool such as the OrCam Read, allows these students to access connected text across types of media and content.

- *Trial of the OrCam Read, by Therapy and Education Connections PLLC, indicates no financial gain and no conflict of interest in reporting the positive outcomes associated with this study.*